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ABSTRACT

Achievement in literacy and numeracy by Australian 14-year-olds was examined by analyzing data from the following studies conducted between 1975 and 1998: the Australian Studies in School Performance; the Australian Studies of Student Performance; the Youth in Transition Survey; and the Longitudinal Surveys of Australian Youth. During the study period, mean scores on achievement on tests of reading and mathematics remained stable, and there was little change in the distribution of scores. Female 14-year-olds scored higher in reading comprehension in 1998 than in 1975, whereas their male counterparts scored lower in 1998 than in 1975. The reading comprehension achievement scores of students whose main language was not English improved significantly. Male students' mean mathematics achievement test score increased during the study period, whereas female students' mean score did not. The mathematics scores of students with parents in the production/laborers group remained stable, whereas those of students with parents from the professional/managerial occupational group declined significantly. Being from a metropolitan versus nonmetropolitan area did not significantly affect reading comprehension or mathematics test scores. (Thirty-five tables/figures are included. The bibliography lists 50 references. The following items are appended: counts of students; results of multivariate analyses for all cohorts; and a note on indigenous Australian students.) (MN)

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say Longitudinal Surveys of Australian Youth

Research Report Number 29

# Achievement in Literacy and Numeracy

## by Australian 14 year-olds, 1975-1998

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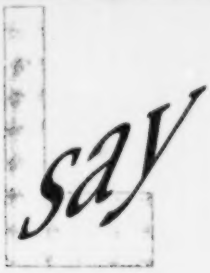


# Longitudinal Surveys of Australian Youth

**Research Report Number 29**

## ACHIEVEMENT IN LITERACY AND NUMERACY BY AUSTRALIAN 14-YEAR-OLDS, 1975-1998

Sheldon Rothman

This report forms part of the Longitudinal Surveys of Australian Youth: a research program that is jointly managed by ACER and the Commonwealth Department of Education, Science and Training (DEST).

The views expressed in this report are those of the author and not necessarily of the Department of Education, Science and Training.

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## EXECUTIVE SUMMARY

Literacy and numeracy are mainstays in Australian schools and have formed the basis for the first national education benchmarks. In 1997, Education Ministers agreed on a national goal, 'that every child leaving primary school should be numerate, and be able to read, write and spell at an appropriate level'. This goal was given more formal status in April 1999, when the Ministerial Council on Education, Employment, Training and Youth Affairs agreed on a wider set of goals for education in Australia in *The Adelaide Declaration on National Goals for Schooling in the Twenty-first Century*.

This LSAY Research Report examines student achievement scores on tests of reading comprehension and mathematics from five studies conducted between 1975 and 1998. The data are from five studies involving young people in Australian schools. The first, the Australian Studies in School Performance, conducted in 1975, and the second, the Australian Studies of Student Performance, conducted in 1980, were major studies of the academic achievements of 10-year-olds and 14-year-olds in Australian schools. The other studies—Youth in Transition in 1989 and the Longitudinal Surveys of Australian Youth in 1995 and 1998—were studies of young people's transitions from school, and included tests of reading comprehension and mathematics similar to the tests used in the earlier achievement studies. The first three studies, in 1975, 1980 and 1989, used 14-year-olds in Australian schools; most of these students were enrolled in Year 9 at the time of the study. The last two studies, in 1995 and 1998, used students in Year 9, most of whom were 14 years of age at the time.

The report examines trends for all students and for smaller groups of students, with results reported by gender, language background, socioeconomic status and location. Multivariate analyses examine how influences on literacy and numeracy among 14-year-old students have changed between 1975 and 1998. It was determined that the subgroup of 14-year-old students was the most appropriate group to use for the multivariate analyses, because changes in school-entry ages and grade retention practices affected the composition of the subgroup comprising 14-year-olds in Year 9. For the trends reported in this Executive Summary, results are presented for only the subgroup of 14-year-old students. Details for all subgroups are contained in the body of the report.

### Trends in Literacy

There has been little change in the average level of achievement on tests of reading comprehension between 1975 and 1998. During this period, mean scores have been stable, and there has been little change in the distribution of scores.

- Female 14-year-old students scored higher in reading comprehension in 1998 than they did in 1975, and male 14-year-old students scored lower. As a result, the difference between males and females in reading comprehension scores increased between 1975 and 1998. In all cohorts, the difference between males and females in reading comprehension was statistically significant.

- Achievement on tests of reading comprehension improved significantly over the period for students whose main language was not English. In all cohorts, the mean for students from language backgrounds other than English (LBOTE) was significantly lower than the mean for students from English-speaking backgrounds; however, mean scores increased for LBOTE students, the proportion of students with scores of 50 and above increased, and the proportion with scores below 40 decreased. Language background also had a statistically significant effect at the school level. In addition to the influence of language background at the student level, as a school's percentage of students from other language backgrounds increased, its scores on tests of reading comprehension decreased.

- The mean score for students with parents in the professional/managerial group decreased significantly over the period, but the distributions have been relatively constant. For students with parents in the production/labourers group, there has been little change in the mean score or in the distributions. Although the difference in the means for these two groups has decreased between 1975 and 1998, all differences were statistically significant. During this period, the school-level measure of socioeconomic status has increased in its influence on reading comprehension scores.

- Mean scores and distributions for student location showed little change over the period. Differences by location were small and not significant across all cohorts, with students from metropolitan locations scoring at the same level as students from non-metropolitan locations.

- The analysis of data for Indigenous Australian students was limited to results for 1995 and 1998, because of sample sizes in the earlier data. The mean score for Indigenous Australian students in the 1995 cohort was not significantly different from the mean score for the 1998 cohort. Differences between Indigenous students' mean scores and non-Indigenous students' mean scores were statistically significant in both years.

**Trends in Numeracy**

Between 1975 and 1998, students' scores on mathematics tests fluctuated, but there was no significant difference between scores achieved by the 1975 and 1998 cohorts. There were some significant differences between groups, and within groups.

- Male students increased their mean score between 1975 and 1998, but there was no difference in female students' means over the period. In all cohorts, differences between male and female students' mean scores were statistically significant. This result is different from results reported for Australia from recent international studies of academic achievement for 13-year-olds (TIMSS) and 15-year-olds (PISA).

- In mathematics, 14-year-old LBOTE students improved their mean score, while there was no change for English-language background students. Although differences in the mean scores between the two groups decreased over the period, the differences were statistically significant in both 1975 and 1998. In the multivariate analyses, the negative influence of other-language background on achievement scores decreased over the period but remained statistically significant. In addition to the influence of language background at the student level, as a school's percentage of students from other language backgrounds increased, its scores on tests of mathematics decreased.

- Among 14-year-old students, those with parents in the production/labourers group had stable mean scores in mathematics, while mean scores for students from the professional and managerial occupational group declined significantly during the period. As a result, differences between groups I and IV declined, but remained statistically significant. These differences were confirmed in the multivariate analyses, which also showed that the school-level measure of socioeconomic status increased in its influence over the same period, as it did for reading comprehension.

- There were no significant differences in mean scores between students from non-metropolitan schools and students from metropolitan schools. There were also non-significant differences noted in the multivariate analyses.

- The analysis of data for Indigenous Australian students was limited to results for 1995 and 1998, because of limitations of the earlier data. The mean score for Indigenous Australian students in the 1995 cohort was not significantly different from the mean

score for the 1998 cohort. Differences between Indigenous students' mean scores and non-Indigenous students' mean scores were statistically significant in both years.

**Implications**

Between 1975 and 1998, there have been many changes in Australian society and Australian education. Enrolments in Australian schools increased rapidly, and the completion of Year 12 by all students has become a major target. The cultural mix of Australia has increased, with increases in the numbers of people from countries where English is not the main language spoken. There has been increased interest in the academic performance of females and males, as separate groups with individual needs, and there has been increased understanding of the role of socioeconomic status in academic and non-academic aspects of education.

The results reported here indicate that the achievements of Australian 14-year-olds in reading comprehension and mathematics have remained constant during the period. For some groups, there has been improvement, most notably for students from language backgrounds other than English. For other groups, however, results indicate a significant achievement gap. The most significant gap is between Indigenous Australian students and all other students in Australian schools. Indigenous Australian students' scores suggest that they will be less likely to complete Year 12 at school, enter higher education or make a successful transition to employment. Without support targeted at their educational needs early in their school careers, Indigenous Australian students will continue to have less favourable outcomes in the future.

## 1. INTRODUCTION

The last half of the twentieth century saw major changes in education in Australia. Between 1950 and 1975, the total number of students enrolled in Australian schools doubled, as post-World War II immigrants arrived in Australia. The birth rate declined through the 1960s, peaked again in the early 1970s, then declined through the rest of the decade to a stable rate. While the birth rate declined through the 1960s and 1970s, enrolments in secondary schools were still increasing, adding another 100,000 students every three-to-four years (NSW Department of Education, 1988).

This period also saw major reviews of secondary education in all States, resulting in changes to the structure of schooling (eg, Wyndham, 1957). Secondary schooling now extends to Year 12, and only New South Wales retains a certificate to mark the transition from junior to senior secondary education (Collins & Vickers, 1999). Increased expectations for education through this period also saw increases in the numbers of students completing secondary education in later years. In 1975, the apparent retention rate to Year 12 was 34.1; it remained around that level through the end of the decade, sitting at 34.5 in 1980. By 1990, the rate had risen to 64.0, and by 2001, to 73.4 (Australian Bureau of Statistics, 1976, 1981, 1991, 2002).

As enrolments increased, so did the interest in student achievement. Following commissioned reports (Bullock, 1975; Coleman, *et al*, 1966) and academic research (Bowles & Gintis, 1976; Jencks, *et al*, 1972) noting the relationship between socioeconomic status and educational achievement in many developed countries, the Australian government began to examine the role of education as a vehicle of social justice, commissioning inquiries on schooling and research on student achievement (Commission of Inquiry into Poverty, 1976; Karmel, 1973; Karmel, 1985). Research in Australia and overseas began to look more closely at the relationship between school factors and student performance, especially after the publication of *Fifteen Thousand Hours* (Rutter, *et al*, 1979) and *A Nation at Risk* (National Commission for Excellence in Education, 1983).

Interest in school improvement practices brought with it the need to measure student achievement more appropriately. This interest was enhanced with the adoption of statistical techniques from other areas that could be used to identify contributions to student achievement at various levels in the education process—student, classroom, schools and higher (Goldstein, 1987; Bryk & Raudenbush, 1992). Hierarchical methods of analysis have assisted in the official assessment of change in scores on State tests in the United States (R. Lee, personal communication, 11 October 2001), and have been used in most of the reports in this series.

### Emphasis on Literacy and Numeracy

Literacy and numeracy form the basis for education benchmarks in Australia. In 1997, Education Ministers representing the Commonwealth, States and Territories, agreed on a national goal, 'that every child leaving primary school should be numerate, and be able to read, write and spell at an appropriate level'. To meet this goal, the ministers agreed to the National Literacy and Numeracy Plan, comprising assessment of all students in their first years of schooling; implementation of early intervention strategies for individual students when required; development of national benchmarks for Years 3, 5 and 7, including testing and reporting against these benchmarks; and teachers' professional development (DEST, 2002).

In April 1999, the Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA) agreed on a common set of goals for education in Australia, updating a 1989 agreement on common goals. Re-emphasising the importance of literacy and numeracy in schooling in *The Adelaide Declaration on National Goals for Schooling in the Twenty-first Century*, the Ministers stated:

> In terms of curriculum, students should have attained the skills of numeracy and English literacy; such that, every student should be numerate, able to read, write, spell and communicate at an appropriate level. (MCEETYA, 1999)

That literacy and numeracy should take such a prominent role in schools is not surprising. Literacy and numeracy have long been seen as fundamentals of the Australian school curriculum. For example, pedagogical practices in the teaching of reading have been debated since at least the nineteenth century (Rothman, 1982).

Recent reports using data from the Longitudinal Surveys of Australian Youth (LSAY) have examined the importance of literacy and numeracy among middle-secondary students. There was a strong relationship between Year 9 achievement in literacy and numeracy and participation in Year 12 (Marks, *et al.*, 2000), between achievement and subject choice in Year 12 (Fullarton & Ainley, 2000), and between achievement and results on tests for tertiary entrance (Marks, *et al.*, 2001). Higher-achieving students were more successful than lower-achieving students at obtaining full-time employment within the first few years of leaving school (Lamb and McKenzie, 2001), although lower-achieving students who had participated in VET in Schools programs were more successful at finding full-time work than those who did no vocational training while at school (Fullarton, 2001).

**Trends in Literacy and Numeracy**

With the heightened concern over increasing disparities in school achievement between groups of students came new approaches to monitor the academic performance of students, overseas and in Australia. Representative samples of students in each American state participate in the annual National Assessment of Educational Progress (NAEP), providing data to monitor achievement in reading, science and mathematics. International studies of student performance in science and mathematics have captured the attention of policy-makers, with 38 countries—including Australia—participating in the Third International Mathematics and Science Study-Repeat (TIMSS-R) in 1999 and 32 countries in the Programme for International Student Assessment (PISA) in 2000.

While there is no regular national program in Australia similar to NAEP, States and Territories conduct regular assessments of student achievement in the primary years, and have recently introduced testing in Year 7. Two major studies of student performance have been conducted in the past in Australia. The Australian Studies in School Performance (ASSP 1975), conducted in October 1975, comprised representative samples of 10- and 14-year-old students tested in all States and Territories. This was the first time that all Australian jurisdictions had participated in a national assessment of student achievement (Keeves & Bourke, 1976). In 1980, representative national testing was repeated as part of the Australian Studies of Student Performance (ASSP 1980) (Bourke, *et al.*, 1981).

Other data on Australian student performance in aspects of literacy and numeracy are available as part of studies on education and youth transitions. The 1989 Youth in Transition (YIT 1989) study, the 1989-1992 Australian Youth Survey (AYS), and the 1995 and 1998 Longitudinal Surveys of Australian Youth (LSAY) used tests of reading comprehension and mathematics achievement to obtain measures of student literacy and numeracy to act as controls in their analyses of the transitions from school made by young people. These tests were developed by the Australian Council for Educational Research (ACER), using some of

the items used in the ASSP 1975 and ASSP 1980 studies. Marks and Ainley (1997) used student achievement data from these studies to provide an analysis of trends in literacy and numeracy from 1975 to 1995. They found no significant change in mean scores across the period, no change in the percentage of students who reached 'mastery' in reading comprehension, and a slight increase in the percentage of students who reached 'mastery' in mathematics.

**The Present Study**

This report concentrates on one aspect of literacy—reading comprehension—and one aspect of numeracy—mathematics—as recorded in Australian studies since 1975. It does this by discussing students' results on tests of reading comprehension and mathematics included in these studies, examining means, medians and the distributions of results and changes over the period. This report extends the work of Marks and Ainley (1997) by including results from the tests taken by members of the LSAY 1998 cohort. Chapter 2 describes the data and methodology used in this report, noting the sources of the data, the samples and limitations of the studies that are used. Chapter 3 presents mean scores, medians and distributions on the reading comprehension tests for the period 1975-1998 for specific subgroups. Chapter 4 presents results on the mathematics tests, repeating the format of Chapter 3. Chapter 5 presents an examination of changes in the influence of selected characteristics of students and schools on the test results, using hierarchical linear models for the 1975, 1995 and 1998 cohorts. Comments in Chapters 3, 4 and 5 are limited to descriptive presentations of summary data and results of the multivariate analyses. Results are discussed in Chapter 6, as are implications of the findings—for policy and practice.

## 2. DATA AND METHODS

### Measures of Achievement in Literacy and Numeracy

The data in this study are from five studies involving young people in Australian schools. The first two studies, ASSP 1975 and ASSP 1980, were major studies of the academic achievements of ten-year-olds and fourteen-year-olds in Australian schools. There were 33 items on both the reading comprehension and mathematics tests in 1975, and 35 items on both tests in 1980. For the subsequent studies—YIT 1989, LSAY 1995 and LSAY 1998—the reading comprehension and mathematics tests each comprised 20 items, and were included to provide an indication of student achievement levels to be used as controls in studies of young people's transitions from school.

Each test was developed by the Australian Council for Educational Research (ACER) and contains a number of items common to at least one other test. The inclusion of these common items allows scores on all tests to be set on a single scale; for the present study, this scale has a mean of 50 and standard deviation of 10. Test scores for four of the studies (ASSP 1975, ASSP 1980, YIT 1989 and LSAY 1995) plus four Australian Youth Study (AYS) samples (1989, 1990, 1991, 1992) had been equated for a previous report on trends in literacy and numeracy in the LSAY series (Marks & Ainley, 1997). Using the same equating procedures, results from the 1998 study were linked to the 1995 results and placed on the underlying common scale. Data from the AYS studies are not included in this report because of differences in the sampling procedures.

### Samples

For the ASSP and YIT studies used in this report, participants were selected based on their age. Keeves & Bourke (1976), describing the selection of fourteen-year-olds for the ASSP 1975 study, argued that age-based samples were more appropriate than grade-based samples 'because of different school entry and grade promotion policies in different parts of Australia' (p. 12). LSAY uses grade-based samples because the main purpose of the program was established to examine the transitions from school: In all States and Territories of Australia, Year 12 is the final school grade, and in most jurisdictions, Year 9 is the final compulsory grade.

For this report, descriptive statistics are reported for three groups of students. First, mean scores, median scores and distributions are presented for all students in the cohort; this group is called the *full cohort*. Second, scores are reported for a subgroup of *14-year-old students*. Third, scores are reported for a subset of *14-year-olds in Year 9*. A brief summary of the numbers of students, their ages and grade levels is contained in Table 1. Comprehensive counts for the cohorts and subgroups are contained in Appendix 1.

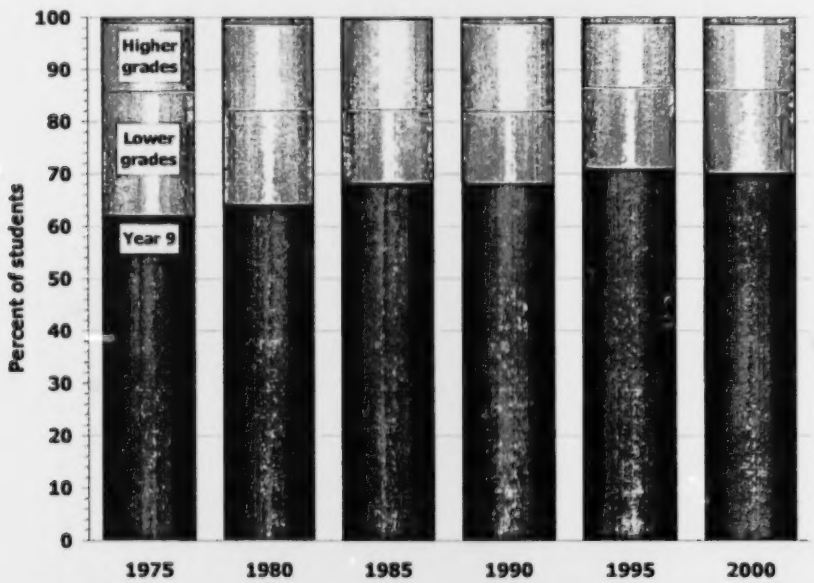
**Table 1 Cohorts used in the present study**

| Cohort | Number of students | Indicative age range | Indicative grade range | Number of 14-year-old students | Number of 14-year-olds in Year 9 |
|---|---|---|---|---|---|
| ASSP 1975 | 6,246 | 14 | 5-11 | 6,246 | 3,959 |
| ASSP 1980 | 5,103 | 14 | 7-10 | 5,076 | 3,349 |
| YIT 1989 | 5,653 | 14 | 7-10 | 5,647 | 3,892 |
| LSAY 1995 | 13,613 | 13-17 | 9 | 7,387 | 7,387 |
| LSAY 1998 | 14,118 | 11-20 | 9 | 8,118 | 8,116 |

*Notes*: Not all students have test scores for both reading comprehension and mathematics. In each cohort, a small number of students were out of the population range but still included in the sample.

Descriptive statistics are included for all three groups because the selection of any one group may be inappropriate to report here. When many of the students in the 1975 and 1980 cohorts had entered school, State education policies and practices affected their school progression. Not all States and Territories had a pre-Year 1 ('Kindergarten', 'Reception' or 'Prep'), and many five-year-olds would have started school in Year 1. In South Australia in 1981, for example, more than 40 per cent of children who had entered school at age five had spent two years or less at school before entering Year 3 (Committee of Enquiry, 1982, pp. 91-92). For some students, progression into the upper primary school was successful; but for many who were not prepared, it meant repetition of one or more primary grades.

Among the earlier cohorts in this report, grade repetition was used more frequently as an approach to remedial education than it was for the later cohorts, thus putting more 14-year-olds in lower grades. In 1975, 62 per cent of 14-year-old students were enrolled in Year 9 and 24 per cent in Year 8 and lower grades; in 1995 and 2000, the proportions changed to 70-71 per cent in Year 9 and 16 per cent in lower grades (ABS, 1976, 1996, 2001). The grade level distribution of 14-year-olds from 1975 to 2000 is shown in Figure 1. Changes to secondary education were also introduced after the 1975 cohort had begun school around 1966, and these changes also may have influenced the transition at the primary school-secondary school nexus, students' progression through secondary school, and students' decisions to remain at school, regardless of the legislated school-leaving age. These changes in the age-grade structure of Australian secondary schooling make it difficult to assume that a single group—14-year-old students, Year 9 students or 14-year-olds in Year 9—can be followed to understand changes in academic achievement.




*Source:* Australian Bureau of Statistics (1976, 1981, 1991, 1996, 2002).

**Figure 1 Grade-level distribution of 14-year-olds in Australian schools, 1975-2000**

For the multivariate analyses in this report, the subgroup of 14-year-old students was selected. It was assumed that among the earlier cohorts, 14-year-olds of lower achievement levels had repeated at least one grade and would be found in grades lower than Year 9. Under this assumption, the subgroup of 14-year-olds in Year 9 would include higher-achieving students. Among the later cohorts, lower-achieving students, who were less likely to have repeated a grade because of an increase in the use of social promotion, would be found in Year 9. By

selecting the subgroup of 14-year-old students for the multivariate analysis, it was assumed that the achievement scores of students in higher grades in the earlier cohorts would be balanced by the scores of students in lower grades, and that the only effect would be on measures of dispersion.

**Student Background Information**

As part of each study, students completed questionnaires that provided information on selected characteristics. Not all of the same questions were asked in each study, but a number of items persisted through all studies. For this reason, there are some gaps in the results reported in Chapters 3 and 4. The items included as student variables in the multivariate analyses are:

*Gender*. Students were asked to indicate whether they were male or female. This information was collected for all cohorts. For the multivariate analyses, this was coded as a dichotomous variable (female=1, male=0) for both the reading comprehension and the mathematics analyses.

*Language background*. Students were asked to identify the main language spoken at home. This information was not collected from the YIT 1989 cohort. To ensure consistency across cohorts and that there were adequate numbers of students in the group, all students who indicated that the main language was a language other than English were grouped together, regardless of language. For the multivariate analyses, language background was coded as a dichotomous variable (English=1, other language=0).

*Family occupational group*. Students in the YIT and LSAY cohorts were asked to indicate their parents' occupations. This information was provided by teachers for the ASSP 1975 cohort, but not collected for the ASSP 1980 cohort. Responses were coded to the occupation classification schema in use at the time. These codes were then collapsed into four major groups: professional/managerial (group I), clerical/sales/service (group II), trades (group III), and production/labourers (group IV). An occupational group was assigned to each student based on the father's occupation; if there was no information on the father's occupation, the mother's occupation was used. For the multivariate analyses at the end of Chapter 3 and the end of Chapter 4, three dichotomous variables were created, representing occupational groups I, II and III. These variables allow comparison to a base of occupational group IV.

*Location*. In the earlier cohorts (1975, 1980, 1989), students were assigned a location according to the location of the school: metropolitan or non-metropolitan. For the later cohorts (1995, 1998), students were assigned a location according to their home postcode, using classifications developed by the Australian Bureau of Statistics and based on population densities. The classifications used in these studies were metropolitan, regional and rural/remote. To ensure consistency across all cohorts, the regional and rural/remote classifications in the later cohorts were collapsed to non-metropolitan. For the multivariate analyses, student location was coded as a dichotomous variable (metropolitan=1, non-metropolitan=0).

Among the LSAY 1998 cohort, 8 per cent of students from rural and remote home locations attended metropolitan schools; their mean reading comprehension and mathematics scores were approximately six points higher than mean scores for students from rural and remote home locations who attended rural and remote schools. Eleven per cent of students from rural and remote home locations attended schools in other non-metropolitan locations; their mean scores were approximately 2 points higher. Because most of the difference in school attendance is found between rural/remote and regional locations (Jones, 2002), the effect of using home location instead of school location for the LSAY cohorts is minimal.

*Indigenous Australian status*. For the ASSP 1975 study, teachers provided information on student background, but not for the ASSP 1980 study, as the collection of information from teachers would cause too much disruption to the schools' daily routines (Bourke, *et al*., 1981, p. 31). This information was not collected from the YIT 1989 cohort. For the LSAY studies, students were asked if they identified as an Indigenous Australian person. Results for Indigenous Australian students are included for the LSAY cohorts only, due to the small sample size in 1975 and the possible misidentification of some students. For the multivariate analyses, Indigenous status was coded as a dichotomous variable (Indigenous=1, non-Indigenous=0). Further information on Indigenous Australian students in LSAY samples is contained in Appendix 3.

**School Information**

To examine the effects schools have on student achievement, three continuous school-level variables were constructed from the student-level data by aggregating individual student characteristics to indicate the percentage of students in a school from the selected group. Gender was not included as a variable, even though there is evidence suggesting that single-sex schools have positive effects on participation, engagement and self-concept, but not necessarily on academic achievement (Carpenter & Hayden, 1987; Fullarton, 2002; Marsh, *et al*, 1988). Indigenous status was also not included, as the small number of Indigenous Australian students in the samples are unevenly distributed across schools, with only a small proportion of schools enrolling Indigenous Australian students.

The aggregated school-level variables used in the multivariate analyses are:

- *Percent Other Language* is the percentage of students in the school who said that the main language spoken at home was a language other than English.

- *Percent Occupational Group I* is the percentage of students in the school with parents in occupational group I (professional/managerial). This variable serves as a proxy measure of socioeconomic status (SES) at the school level.

- *Percent Occupational Group IV* is the percentage of students in the school with parents in occupational group IV (production/labourers). This variable serves as a proxy measure of socioeconomic disadvantage at the school level, concentrating on the effects of high concentrations of students from lower SES families.

## 3. TRENDS IN LITERACY

Starting with the Australian Studies in School Performance (ASSP) in 1975, literacy achievement has been measured with tests of reading comprehension developed by ACER. Table 2 presents descriptive statistics on student achievement on these tests over the five cohorts. The table shows means, medians and distributions for the full cohort (all students tested), for 14-year-old students, and for 14-year-olds in Year 9 only. The rest of the chapter contains tables showing achievement in reading comprehension for different groups of students. Multivariate analyses are presented in Chapter 5, examining how the influence of selected background characteristics has changed over the period.

**Table 2 Means and standard errors, medians, and distribution of scaled scores on reading comprehension tests, 1975-1998**

| | Scaled score | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|
| | Mean (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | |
| ASSP 1975 | 50.6 (0.36) | 51.9 | 5% | 12% | 29% | 36% | 18% |
| ASSP 1980 | 50.5 (0.34) | 52.4 | 4% | 14% | 29% | 30% | 25% |
| YIT 1989 | 50.5 (0.33) | 51.0 | 3% | 12% | 32% | 40% | 13% |
| LSAY 1995 | 49.8 (0.25) | 51.1 | 2% | 17% | 29% | 41% | 12% |
| LSAY 1998 | 50.1 (0.26) | 50.7 | 3% | 14% | 29% | 38% | 16% |
| **14-year-old students** | | | | | | | |
| ASSP 1975 | 50.6 (0.36) | 51.9 | 5% | 12% | 29% | 36% | 18% |
| ASSP 1980 | 50.5 (0.34) | 52.4 | 3% | 13% | 29% | 30% | 25% |
| YIT 1989 | 50.5 (0.33) | 51.0 | 3% | 12% | 32% | 40% | 13% |
| LSAY 1995 | 50.3 (0.24) | 51.1 | 1% | 15% | 30% | 42% | 12% |
| LSAY 1998 | 50.6 (0.26) | 50.7 | 2% | 13% | 29% | 40% | 16% |
| **14-year-olds in year 9** | | | | | | | |
| ASSP 1975 | 52.7 (0.30) | 55.1 | 2% | 8% | 27% | 41% | 21% |
| ASSP 1980 | 52.0 (0.32) | 52.4 | 2% | 11% | 27% | 33% | 27% |
| YIT 1989 | 51.7 (0.33) | 51.0 | 1% | 9% | 31% | 44% | 15% |
| LSAY 1995 | 50.3 (0.24) | 51.1 | 1% | 15% | 30% | 42% | 12% |
| LSAY 1998 | 50.6 (0.26) | 50.7 | 2% | 13% | 29% | 40% | 16% |

*Full cohort*. Between 1975 and 1989, the mean scaled score for the full cohort was stable, then decreased 0.7 scaled score points for 1995 and increased 0.3 scaled score points for 1998. The difference in means between 1975 and 1998 was statistically significant ($p$=.044). For each cohort, the percentage of students who scored at 50 or above was 53 to 55 per cent. Fourteen per cent of the YIT 1989 cohort scored lower than 40, compared to 17 or 18 per cent in the other years.

*14-year-old students*. Between 1975 and 1998, the mean scaled score for 14-year-old students was stable, with only minor fluctuations. The lowest mean score was in 1995 (50.3), and the highest means were in 1975 and 1998 (50.6), but there is no significant difference among mean scores for the five cohorts. The percentage of 14-year-old students who scored above 50 fluctuated between 54 and 56 per cent. These distributions are shown in Figure 2.[1]

*14-year-olds in Year 9*. Between 1975 and 1998, the mean scaled score for 14-year-olds in Year 9 dropped from 52.7 in 1975 to 50.3 in 1995, with a slight increase of 0.3 scaled score

[1] All figures in this report contain box-and-whisker plots. The box represents the middle 50 per cent of scores. Each 'whisker' represents the top or bottom 25 per cent of scores, as long as the whisker is no more than 1.5 times the length of the box. Scores that are more than 1.5 box-lengths from a box-end are considered 'outliers'; scores that are more than 3.0 box-lengths from a box-end are considered 'extremes'. Outliers and extremes are not included in the box-and-whisker plots in this report.

points in 1998. In 1975, 60 per cent of this subgroup had scored 50 or above, compared to 55 per cent in 1995 and 56 per cent in 1998. The difference in means between 1975 and 1998 was statistically significant ($p<.001$).

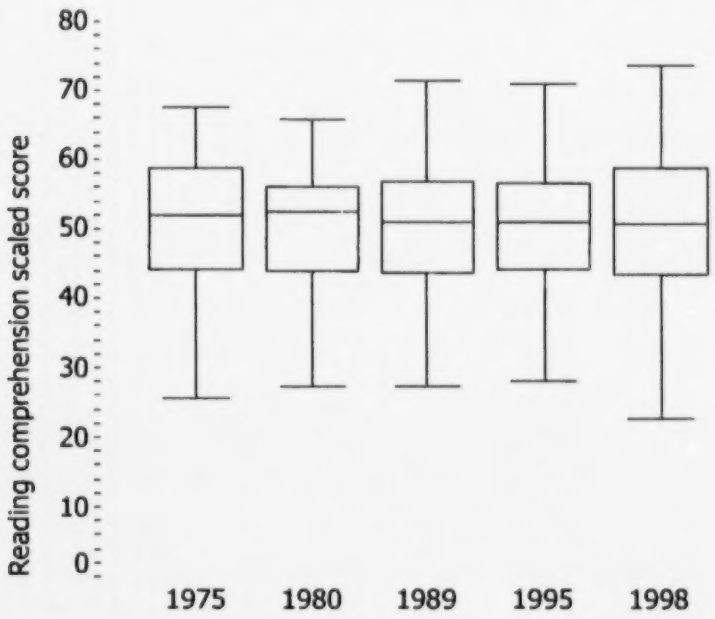



**Figure 2 Distribution of reading comprehension test scores among 14-year-old students, 1975-1998**

**Trends in Literacy for Groups of Students**

*Gender*

Mean scaled scores on the reading comprehension tests differed by gender between 1975 and 1998, as shown in Table 3. During this period, the mean scaled score for male students decreased for all three subgroups, from 50.2 in 1975 to 49.0 in 1998 among the full cohort, from 50.2 to 49.6 among 14-year-old students, and from 52.4 to 49.6 among 14-year-olds in Year 9. For the three subgroups, the difference between 1975 and 1998 was statistically significant (14-year-old male students, $p=.005$; others, $p<.001$). Female students' mean scaled scores were relatively stable during the same period. Among the full cohort and the group of 14-year-old students, the 1998 mean scaled score was the highest of all five studies, although there was no statistically significant difference between 1975 and 1998; among 14-year-olds in Year 9, the 1998 mean scaled score was the first increase after a series of decreases since 1975, and the difference between 1975 and 1998 was statistically significant ($p=.003$).

Females scored higher than males among all subgroups of all five cohorts, with all differences statistically significant (ASSP 1975, $p=.005$; all other cohorts, $p<.001$). The differences in scores between males and females increased over the period. Between 1975 and 1989, the difference between the mean score for males and the mean score for females ranged from 0.8 and 1.1 scaled score points among the full cohort; in 1995, the difference was 1.9 scaled score points, and in 1998, 2.3 scaled score points. Among 14-year-old students and 14-year-olds in

Year 9, the difference between male and female students' mean scores also increased for 1995 (1.8 scaled score points) and 1998 (2.0 scaled score points).

There were also changes in the distributions of scores over the period. In 1975, 18 per cent of 14-year-old males had scaled scores of 40 or below, and in 1998, 19 per cent had scores in that range. The proportion of males with scores above 50 declined from 54 per cent in 1975 to 51 per cent in 1998. Among females, the proportion of 14-year-old students with scores of 40 or below dropped from 15 per cent in 1975 to 12 per cent in 1998, and the proportion with scores above 50 increased from 55 per cent in 1975 to 60 per cent in 1998.

**Table 3 Means and standard errors, medians, and distribution of scaled scores on reading comprehension tests, by gender, 1975-1998**

| Males | Scaled score | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|
| | Mean (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | |
| ASSP 1975 | 50.2 (0.48) | 51.9 | 6% | 12% | 28% | 36% | 18% |
| ASSP 1980 | 50.0 (0.46) | 52.4 | 5% | 14% | 29% | 29% | 24% |
| YIT 1989 | 50.1 (0.44) | 51.0 | 4% | 13% | 31% | 38% | 13% |
| LSAY 1995 | 48.8 (0.34) | 48.6 | 3% | 20% | 29% | 38% | 10% |
| LSAY 1998 | 49.0 (0.31) | 48.1 | 4% | 16% | 30% | 35% | 14% |
| **14-year-old students** | | | | | | | |
| ASSP 1975 | 50.2 (0.48) | 51.9 | 6% | 12% | 28% | 36% | 18% |
| ASSP 1980 | 50.0 (0.46) | 52.4 | 5% | 14% | 29% | 29% | 24% |
| YIT 1989 | 50.1 (0.44) | 51.0 | 4% | 13% | 31% | 38% | 13% |
| LSAY 1995 | 49.3 (0.33) | 48.6 | 2% | 18% | 31% | 40% | 10% |
| LSAY 1998 | 49.6 (0.32) | 50.7 | 3% | 16% | 30% | 36% | 15% |
| **14-year-olds in year 9** | | | | | | | |
| ASSP 1975 | 52.4 (0.39) | 55.1 | 3% | 8% | 27% | 41% | 21% |
| ASSP 1980 | 51.6 (0.47) | 52.4 | 3% | 12% | 26% | 32% | 27% |
| YIT 1989 | 51.2 (0.44) | 51.0 | 2% | 11% | 31% | 41% | 15% |
| LSAY 1995 | 49.3 (0.33) | 48.6 | 2% | 18% | 31% | 40% | 10% |
| LSAY 1998 | 49.6 (0.32) | 50.7 | 3% | 16% | 30% | 36% | 15% |

| Females | Scaled score | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|
| | Mean (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | |
| ASSP 1975 | 51.1 (0.39) | 51.9 | 3% | 12% | 30% | 37% | 18% |
| ASSP 1980 | 51.1 (0.39) | 52.4 | 2% | 13% | 29% | 30% | 26% |
| YIT 1989 | 50.9 (0.39) | 51.0 | 2% | 10% | 33% | 42% | 13% |
| LSAY 1995 | 50.7 (0.27) | 51.1 | 2% | 14% | 28% | 43% | 13% |
| LSAY 1998 | 51.3 (0.31) | 50.7 | 2% | 12% | 27% | 42% | 18% |
| **14-year-old students** | | | | | | | |
| ASSP 1975 | 51.1 (0.39) | 51.9 | 3% | 12% | 30% | 37% | 18% |
| ASSP 1980 | 51.1 (0.39) | 52.4 | 2% | 13% | 29% | 30% | 26% |
| YIT 1989 | 50.9 (0.39) | 51.0 | 2% | 10% | 33% | 42% | 13% |
| LSAY 1995 | 51.1 (0.26) | 51.1 | 1% | 13% | 29% | 44% | 13% |
| LSAY 1998 | 51.6 (0.31) | 53.2 | 1% | 11% | 27% | 43% | 17% |
| **14-year-olds in year 9** | | | | | | | |
| ASSP 1975 | 52.9 (0.39) | 55.1 | 1% | 9% | 28% | 41% | 22% |
| ASSP 1980 | 52.4 (0.34) | 52.4 | 1% | 9% | 28% | 34% | 28% |
| YIT 1989 | 52.0 (0.42) | 51.0 | 1% | 8% | 31% | 46% | 15% |
| LSAY 1995 | 51.1 (0.26) | 51.1 | 1% | 13% | 29% | 44% | 13% |
| LSAY 1998 | 51.6 (0.31) | 53.2 | 1% | 11% | 27% | 43% | 17% |

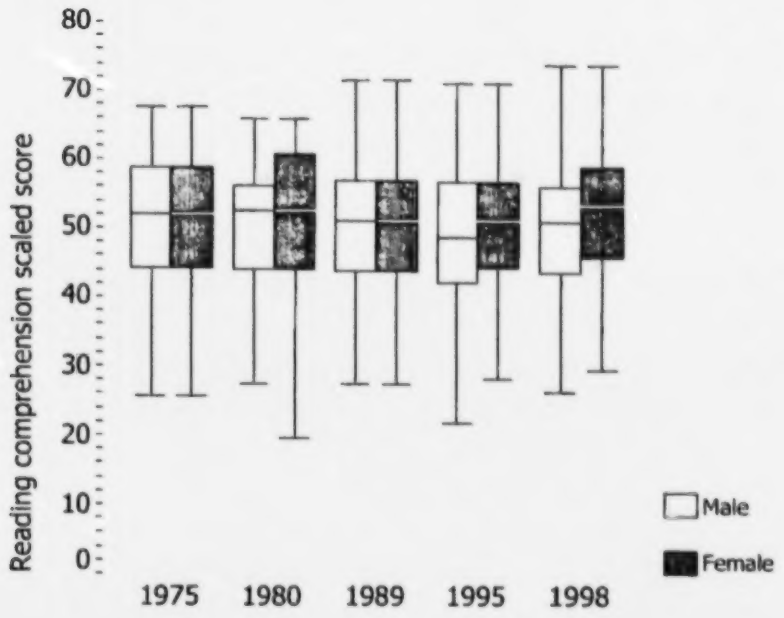



**Figure 3** **Distribution of reading comprehension test scores among 14-year-old students, by gender, 1975-1998**

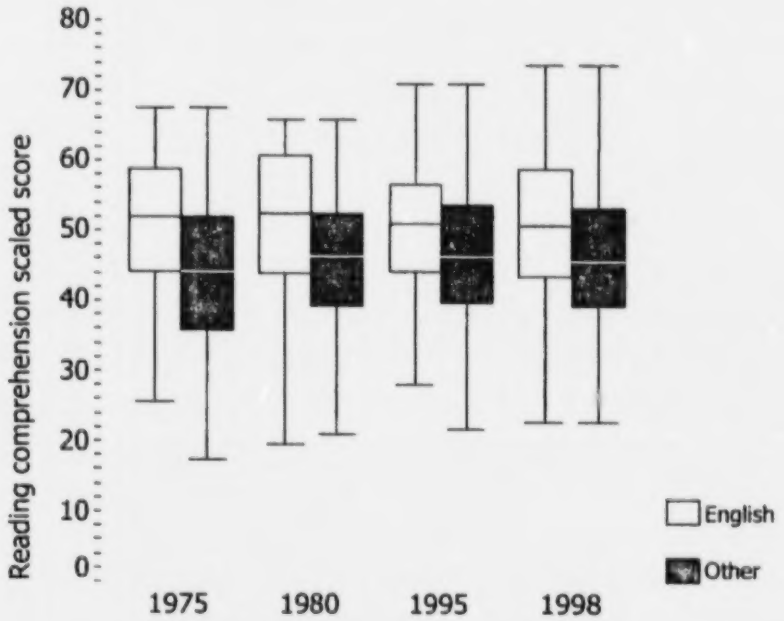



**Figure 4** **Distribution of reading comprehension test scores, by main language spoken at home, 1975-1998**

The distributions of scaled scores for 14-year-old male and female students are represented in Figure 3. The 'box-and-whisker' plots in the figure show similar distributions in the ASSP 1975 and YIT 1989 cohorts, differences between males and females in the distributions of scores in the ASSP 1980 cohort, and that the medians for males and females were different in the LSAY 1995 and 1998 cohorts. In all cohorts, the scores that represent the 90th percentile (the tops of the 'whiskers') were the same for males and females.

*Language Background*

Information on the language spoken at home was collected from the ASSP 1975 and 1980 cohorts, and from the LSAY 1995 and 1998 cohorts (see Table 4). From 1975 to 1998, for students from homes where English is the main language spoken, the mean reading comprehension score has been relatively stable. Among the full cohort, the mean score was 51.0 in 1975 and 1980, 50.4 in 1995, and 50.7 in 1998. Among 14-year-old students, the mean score was 51.0 in 1975, 1980 and 1998. Among 14-year-olds in Year 9, the mean score decreased from 53.0 in 1975 to 50.7 in 1995, then increased to 51.0 in 1998.

**Table 4 Means and standard errors, medians, and distribution of scaled scores on reading comprehension tests, by main language spoken at home, 1975-1998**

| English | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 51.0 | (0.35) | 51.9 | 4% | 11% | 29% | 37% | 18% |
| ASSP 1980 | 51.0 | (0.31) | 52.4 | 3% | 13% | 28% | 30% | 26% |
| LSAY 1995 | 50.4 | (0.23) | 51.1 | 2% | 15% | 28% | 42% | 12% |
| LSAY 1998 | 50.7 | (0.25) | 50.7 | 2% | 13% | 28% | 40% | 17% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 51.0 | (0.35) | 51.9 | 4% | 11% | 29% | 37% | 18% |
| ASSP 1980 | 51.0 | (0.31) | 52.4 | 3% | 12% | 28% | 31% | 26% |
| LSAY 1995 | 50.7 | (0.23) | 51.1 | 1% | 14% | 29% | 43% | 12% |
| LSAY 1998 | 51.0 | (0.25) | 50.7 | 2% | 12% | 28% | 41% | 17% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 53.0 | (0.28) | 55.1 | 2% | 8% | 27% | 42% | 22% |
| ASSP 1980 | 52.4 | (0.29) | 52.4 | 2% | 10% | 26% | 34% | 28% |
| LSAY 1995 | 50.7 | (0.23) | 51.1 | 1% | 14% | 29% | 43% | 12% |
| LSAY 1998 | 51.0 | (0.25) | 50.7 | 2% | 12% | 28% | 41% | 17% |

| Language other than English | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 43.9 | (1.04) | 44.1 | 14% | 24% | 33% | 21% | 8% |
| ASSP 1980 | 45.0 | (1.02) | 46.4 | 8% | 24% | 38% | 20% | 11% |
| LSAY 1995 | 44.8 | (0.63) | 44.1 | 6% | 30% | 33% | 27% | 5% |
| LSAY 1998 | 46.4 | (0.61) | 45.7 | 6% | 22% | 34% | 28% | 10% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 43.9 | (1.04) | 44.1 | 14% | 24% | 33% | 21% | 8% |
| ASSP 1980 | 45.0 | (1.02) | 46.4 | 8% | 24% | 38% | 20% | 11% |
| LSAY 1995 | 46.3 | (0.59) | 46.3 | 4% | 26% | 35% | 30% | 6% |
| LSAY 1998 | 46.9 | (0.65) | 45.7 | 5% | 22% | 35% | 29% | 10% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 45.4 | (1.56) | 46.5 | 10% | 20% | 35% | 23% | 11% |
| ASSP 1980 | 46.6 | (0.94) | 46.4 | 5% | 22% | 42% | 19% | 13% |
| LSAY 1995 | 46.3 | (0.59) | 46.3 | 4% | 26% | 35% | 30% | 6% |
| LSAY 1998 | 47.0 | (0.65) | 45.7 | 5% | 22% | 35% | 29% | 10% |

For students from homes where a language other than English is the main language spoken, the mean reading comprehension score increased between 1975 and 1998 among each subgroup. Among the full cohort and 14-year-olds in Year 9, there was a slight decrease in mean scores between 1980 and 1995, but an increase between 1995 and 1998. Among 14-year-old students, the mean score increased with each cohort; the difference in the means between 1975 and 1998 was statistically significant ($p$=.008).

Between 1975 and 1998, there has been a change in the distribution of scores for students from homes where a language other than English is the main language spoken. Among 14-year-old students, 14 per cent had scores below 30 in 1975, and 38 per cent had scores below 40. In 1998, only 5 per cent had scores below 30, and 27 per cent had scores below 40. There was also an increase in the proportion of 14-year-old students with scores of 50 or above, from 29 per cent in 1975 to 39 per cent in 1998.

The distributions of scores for students from homes where a language other than English is the main language spoken are shown in the box-and-whisker plots in Figure 4. In 1975, the median score for other-language background students, represented by the line across the darker box, was at the same point as the bottom of the box for English-language background students, which represents the 25$^{th}$ percentile. In 1998, the median for other-language background students had increased, both absolutely and relative to the scores for English-language background students. For all cohorts and among all subgroups, the differences between the means for English-language background students and other-language background students were statistically significant ($p$<.001).

*Family Occupational Groups*

Information on student achievement by family occupational background is contained in Table 5. Details on parents' occupations were not collected in 1980, but for all other cohorts, the data were categorised into four broad groups: professional/managerial (group I), clerical/sales/service (group II), trades (group III), and production/labourers (group IV). For students with parents in the professional/managerial group (group I), the mean reading comprehension score decreased from 54.1 in 1975 to 52.4 in 1995 among the full cohort, then increased to 52.9 in 1998. A similar pattern of decreases to 1995 and an increase to 1998 occurred among 14-year-old students and 14-year-olds in Year 9. Among all subgroups for occupational group I, the differences between 1975 and 1998 were statistically significant ($p$<.001).

For students with parents in the clerical/sales/service group (group II), the mean reading comprehension score also decreased from 1975 to 1995, and then remained relatively stable for 1998. Students with parents in trades occupations (group III) exhibited a different pattern: Between 1975 and 1989, the mean reading comprehension scores of both the full cohort and the 14-year-old students were stable at 51.1; their mean scores decreased for 1995, then increased for 1998. For students with parents employed as production workers and labourers (group IV), mean scores were relatively stable until 1995, then decreased in 1998; the difference between the mean in 1975 and the mean in 1998 was not statistically significant.

In 1975, the difference between the mean score for the professional/managerial occupational group (group I) and the production/labourers occupational group (group IV) was 5.5 scaled score points among 14-year-old students. That difference decreased to 5.2 points in 1989 and 3.8 points in 1995. Marks and Ainley (1997) noted this change as a decline in the influence of occupational background on student achievement. In 1998, however, the mean score for 14-year-old students in the professional/managerial group increased and the mean score for 14-year-old students in the production/labourers decreased. For all cohorts and among all subgroups, all differences between mean scores for students in these two groups were statistically significant ($p$<.001).

**Table 5 Means and standard errors, medians, and distribution of scaled scores on reading comprehension tests, by family occupational group, 1975-1998**

| Occupational | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| Group I | Mean | (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 54.1 | (0.35) | 55.1 | 2% | 6% | 22% | 44% | 26% |
| YIT 1989 | 53.8 | (0.38) | 53.8 | 1% | 5% | 27% | 46% | 21% |
| LSAY 1995 | 52.4 | (0.22) | 53.7 | 1% | 11% | 25% | 46% | 17% |
| LSAY 1998 | 52.9 | (0.28) | 53.2 | 1% | 9% | 23% | 44% | 23% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 54.1 | (0.35) | 55.1 | 2% | 6% | 22% | 44% | 26% |
| YIT 1989 | 53.9 | (0.38) | 53.8 | 1% | 5% | 26% | 46% | 21% |
| LSAY 1995 | 52.6 | (0.25) | 53.7 | 0% | 10% | 25% | 48% | 17% |
| LSAY 1998 | 53.3 | (0.28) | 53.2 | 1% | 8% | 23% | 44% | 23% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 55.4 | (0.38) | 55.1 | 1% | 5% | 19% | 46% | 29% |
| YIT 1989 | 54.7 | (0.41) | 53.8 | 0% | 4% | 24% | 50% | 22% |
| LSAY 1995 | 52.6 | (0.25) | 53.7 | 0% | 10% | 25% | 48% | 17% |
| LSAY 1998 | 53.3 | (0.28) | 53.2 | 1% | 8% | 23% | 44% | 23% |

| Occupational | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| Group II | Mean | (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 51.9 | (0.49) | 51.9 | 4% | 11% | 27% | 37% | 22% |
| YIT 1989 | 51.1 | (0.45) | 51.0 | 2% | 12% | 30% | 43% | 14% |
| LSAY 1995 | 50.1 | (0.31) | 51.1 | 1% | 15% | 30% | 44% | 10% |
| LSAY 1998 | 50.1 | (0.31) | 50.7 | 2% | 13% | 31% | 41% | 14% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 51.9 | (0.49) | 51.9 | 4% | 11% | 27% | 37% | 22% |
| YIT 1989 | 51.1 | (0.45) | 51.0 | 2% | 12% | 30% | 43% | 14% |
| LSAY 1995 | 50.2 | (0.35) | 51.1 | 1% | 13% | 33% | 44% | 9% |
| LSAY 1998 | 50.3 | (0.36) | 50.7 | 2% | 13% | 31% | 41% | 14% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 53.8 | (0.45) | 55.1 | 1% | 8% | 24% | 42% | 25% |
| YIT 1989 | 51.7 | (0.52) | 51.0 | 2% | 11% | 27% | 46% | 14% |
| LSAY 1995 | 50.2 | (0.35) | 51.1 | 1% | 13% | 33% | 44% | 9% |
| LSAY 1998 | 50.3 | (0.36) | 50.7 | 2% | 13% | 31% | 41% | 14% |

| Occupational | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| Group III | Mean | (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 51.1 | (0.47) | 51.9 | 3% | 10% | 32% | 37% | 18% |
| YIT 1989 | 51.1 | (0.44) | 51.0 | 1% | 10% | 34% | 45% | 11% |
| LSAY 1995 | 48.8 | (0.28) | 48.6 | 1% | 19% | 34% | 37% | 9% |
| LSAY 1998 | 49.2 | (0.25) | 50.7 | 3% | 15% | 32% | 39% | 12% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 51.1 | (0.47) | 51.9 | 3% | 10% | 32% | 37% | 18% |
| YIT 1989 | 51.1 | (0.44) | 51.0 | 1% | 10% | 34% | 45% | 11% |
| LSAY 1995 | 49.2 | (0.33) | 48.6 | 2% | 17% | 34% | 39% | 9% |
| LSAY 1998 | 49.4 | (0.28) | 50.7 | 2% | 15% | 32% | 39% | 12% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 52.5 | (0.48) | 51.9 | 2% | 7% | 31% | 39% | 21% |
| YIT 1989 | 51.9 | (0.50) | 51.0 | 1% | 8% | 33% | 46% | 13% |
| LSAY 1995 | 49.2 | (0.33) | 48.6 | 2% | 17% | 34% | 39% | 9% |
| LSAY 1998 | 49.4 | (0.28) | 50.7 | 2% | 15% | 32% | 39% | 12% |

**Table 5** **Means and standard errors, medians, and distribution of scaled scores on reading comprehension tests, by family occupational group, 1975-1998 (continued)**

| Occupational | Scaled score | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|
| Group IV | Mean (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | |
| ASSP 1975 | 48.6 (0.46) | 49.0 | 7% | 14% | 34% | 33% | 12% |
| YTT 1989 | 48.7 (0.57) | 48.5 | 4% | 14% | 36% | 39% | 7% |
| LSAY 1995 | 48.5 (0.35) | 48.6 | 3% | 20% | 32% | 38% | 8% |
| LSAY 1998 | 47.7 (0.30) | 48.1 | 3% | 19% | 33% | 34% | 10% |
| **14-year-old students** | | | | | | | |
| ASSP 1975 | 48.6 (0.46) | 49.0 | 7% | 14% | 34% | 33% | 12% |
| YTT 1989 | 48.7 (0.57) | 48.5 | 4% | 14% | 36% | 39% | 7% |
| LSAY 1995 | 48.8 (0.39) | 48.6 | 2% | 19% | 33% | 38% | 8% |
| LSAY 1998 | 48.3 (0.35) | 48.1 | 2% | 19% | 33% | 35% | 11% |
| **14-year-olds in year 9** | | | | | | | |
| ASSP 1975 | 50.6 (0.53) | 51.9 | 4% | 10% | 32% | 38% | 16% |
| YTT 1989 | 50.0 (0.47) | 51.0 | 2% | 11% | 36% | 44% | 7% |
| LSAY 1995 | 48.8 (0.39) | 48.6 | 2% | 19% | 33% | 38% | 8% |
| LSAY 1998 | 48.3 (0.35) | 48.1 | 2% | 19% | 33% | 35% | 11% |

*Note:* Group I includes managers and administrators, professionals and associate professionals. Group II includes clerical, sales and service workers. Group III includes tradespersons and related workers. Group IV includes intermediate production and transport workers, and labourers and related workers.

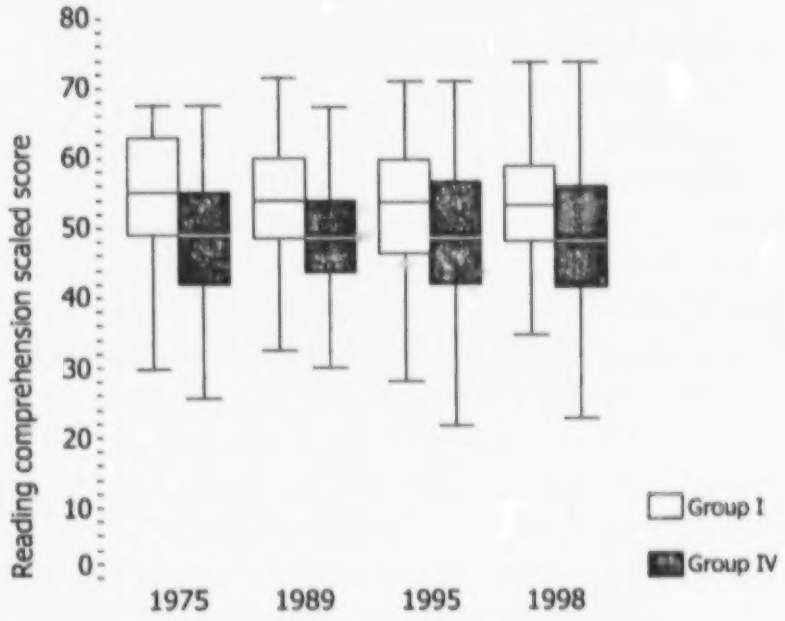



**Figure 5** **Distribution of reading comprehension test scores among 14-year-old students from professional and managerial (occupational group I) families and labourers and related workers (occupational group IV) families, 1975-1998**

There have been small changes to the distributions of scores by family occupation group, as shown in Table 5. For 14-year-old students from occupational group I, 8 per cent of scores in 1975 were below 40; in 1998, 9 per cent were below 40. Over the same period, about two-thirds of scores for students from families in occupational group I were at 50 or above. For 14-year-old students from families in occupational groups II and III, there has been little change in the percentage of scores below 40, but there have been slight decreases in scores of 50 or above between 1975 and 1998. The distributions of scores for students from families in occupational group IV show the least change over the period. In 1975, 21 per cent of scores were below 40, and 45 per cent were at 50 or above. In 1998, 21 per cent were below 40, and 46 per cent were at 50 or above. The percentage of scores below 30, however, decreased from 7 per cent to 2 per cent, indicating a decrease in the number of very low scores among students from occupational group IV. The distributions of occupational groups I and IV are represented in the box-and-whisker plots of Figure 5.

*Geographic Location*

Table 6 shows mean reading comprehension scores for students from metropolitan and non-metropolitan locations. For students from non-metropolitan locations, the mean score increased from 50.0 in 1975 to 50.6 in 1989 among the full cohort and 14-year-old students. Among the full cohort, the mean score then decreased to 49.6 in 1995 and 1998; among 14-year-old students, the mean score decreased to 50.0 in 1995, then increased to 50.2 in 1998. Among 14-year-olds in Year 9, the mean score was relatively stable from 1975 to 1989; it then decreased to 50.0 in 1995 and increased to 50.2 in 1998. The difference between the mean in 1975 and the mean in 1998 was not statistically significant among the 14-year-old subgroup.

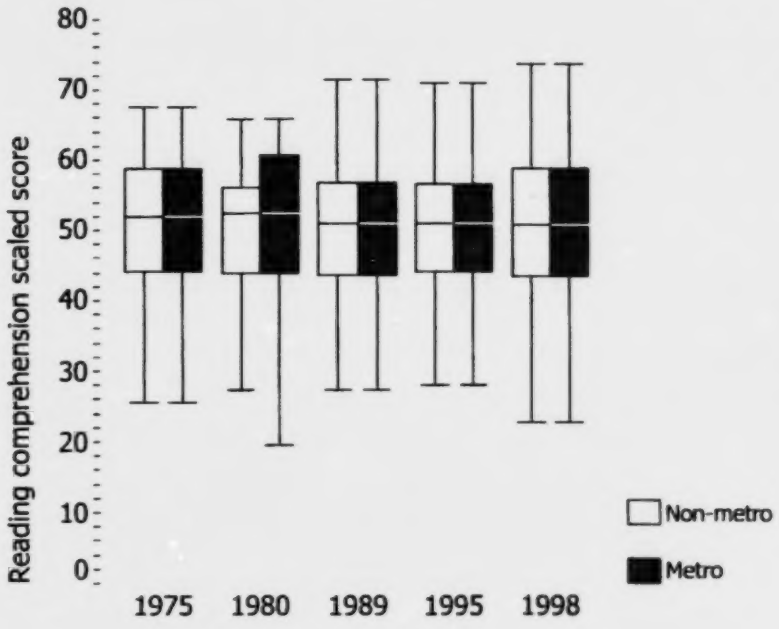



**Figure 6 Distribution of reading comprehension test scores among 14-year-old students, by geographic location, 1975-1998**

**Table 6 Means and standard errors, medians, and distribution of scaled scores on reading comprehension tests, by geographic location, 1975-1998**

| Non-metropolitan | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 50.0 | (0.47) | 51.9 | 6% | 12% | 30% | 36% | 15% |
| ASSP 1980 | 50.2 | (0.42) | 52.4 | 4% | 14% | 29% | 29% | 23% |
| YIT 1989 | 50.6 | (0.34) | 51.0 | 3% | 10% | 31% | 44% | 12% |
| LSAY 1995 | 49.6 | (0.27) | 51.1 | 2% | 17% | 29% | 41% | 10% |
| LSAY 1998 | 49.6 | (0.30) | 50.7 | 4% | 14% | 29% | 38% | 15% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 50.0 | (0.47) | 51.9 | 6% | 12% | 30% | 36% | 15% |
| ASSP 1980 | 50.3 | (0.42) | 52.4 | 4% | 14% | 29% | 29% | 23% |
| YIT 1989 | 50.6 | (0.34) | 51.0 | 3% | 10% | 31% | 44% | 12% |
| LSAY 1995 | 50.0 | (0.29) | 51.1 | 1% | 16% | 29% | 43% | 10% |
| LSAY 1998 | 50.2 | (0.30) | 50.7 | 2% | 13% | 29% | 40% | 15% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 51.9 | (0.39) | 51.9 | 2% | 9% | 29% | 41% | 19% |
| ASSP 1980 | 52.0 | (0.41) | 52.4 | 2% | 11% | 26% | 33% | 27% |
| YIT 1989 | 51.8 | (0.35) | 51.0 | 2% | 8% | 28% | 50% | 12% |
| LSAY 1995 | 50.0 | (0.29) | 51.1 | 1% | 16% | 29% | 43% | 10% |
| LSAY 1998 | 50.2 | (0.30) | 50.7 | 2% | 13% | 29% | 40% | 15% |

| Metropolitan | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 51.1 | (0.51) | 51.9 | 4% | 12% | 29% | 36% | 19% |
| ASSP 1980 | 50.7 | (0.49) | 52.4 | 3% | 13% | 29% | 30% | 25% |
| YIT 1989 | 50.5 | (0.49) | 51.0 | 3% | 12% | 33% | 38% | 14% |
| LSAY 1995 | 50.0 | (0.39) | 51.1 | 2% | 16% | 29% | 40% | 13% |
| LSAY 1998 | 50.4 | (0.36) | 50.7 | 2% | 14% | 28% | 39% | 17% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 51.1 | (0.51) | 51.9 | 4% | 12% | 29% | 36% | 19% |
| ASSP 1980 | 50.7 | (0.49) | 52.4 | 3% | 13% | 29% | 30% | 25% |
| YIT 1989 | 50.5 | (0.49) | 51.0 | 3% | 12% | 33% | 38% | 14% |
| LSAY 1995 | 50.5 | (0.36) | 51.1 | 1% | 14% | 30% | 41% | 13% |
| LSAY 1998 | 50.9 | (0.37) | 50.7 | 2% | 13% | 28% | 40% | 17% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 53.1 | (0.41) | 55.1 | 2% | 8% | 26% | 41% | 23% |
| ASSP 1980 | 52.0 | (0.45) | 52.4 | 2% | 10% | 27% | 33% | 27% |
| YIT 1989 | 51.6 | (0.49) | 51.0 | 1% | 10% | 33% | 40% | 16% |
| LSAY 1995 | 50.5 | (0.36) | 51.1 | 1% | 14% | 30% | 41% | 13% |
| LSAY 1998 | 50.9 | (0.37) | 50.7 | 2% | 13% | 28% | 40% | 17% |

Between 1975 and 1995, the mean reading comprehension score for students from metropolitan locations decreased from 51.1 to 50.0 among the full cohort, and increased to 50.4 in 1998. Among 14-year-old students, the mean decreased from 51.1 in 1975 to 50.5 in 1989 and 1995, and increased to 50.9 in 1998. This general pattern was also seen among 14-year-olds in Year 9, with an increase for 1998 after decreases between 1975 and 1995. The difference between 1975 and 1998 among 14-year-olds was not statistically significant, although it was among the full cohorts and 14-year-olds in Year 9.

There was very little difference between metropolitan and non-metropolitan students in their reading comprehension scores. The small gap between these groups decreased between 1975 and 1989; in the latter year, non-metropolitan students had a slightly higher (but not significantly higher) mean score. For the LSAY 1995 and 1998 cohorts, however,

metropolitan students had slightly higher scores among all subgroups. Across all cohorts, the differences are not statistically significant.

*Indigenous Australians*

Indigenous Australian students constitute approximately 3 per cent of each of the 1995 and LSAY 1998 cohorts. In 1995, their mean scaled score on the reading comprehension tests was 43.9, 5.9 scaled score points lower than the mean for the full cohort. In 1998, the mean for Indigenous students was 42.7, which was 7.4 points lower than the mean for the full cohort (see Table 7). There are no comparable data from previous cohorts. The proportion of students with scores below 40 increased from 38 per cent in 1995 to 42 per cent in 1998, and the proportion with scores of 50 and above decreased from 26 per cent to 22 per cent. The change in the distributions is represented in the box-and-whisker plots in Figure 7.

**Table 7 Means and standard errors, medians, and distribution of scaled scores on reading comprehension tests, Indigenous Australian students, 1995-1998**

| | Scaled score | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|
| | Mean (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | |
| LSAY 1995 | 43.9 (0.51) | 44.1 | 6% | 32% | 36% | 22% | 4% |
| LSAY 1998 | 42.6 (0.51) | 41.4 | 10% | 32% | 37% | 19% | 3% |

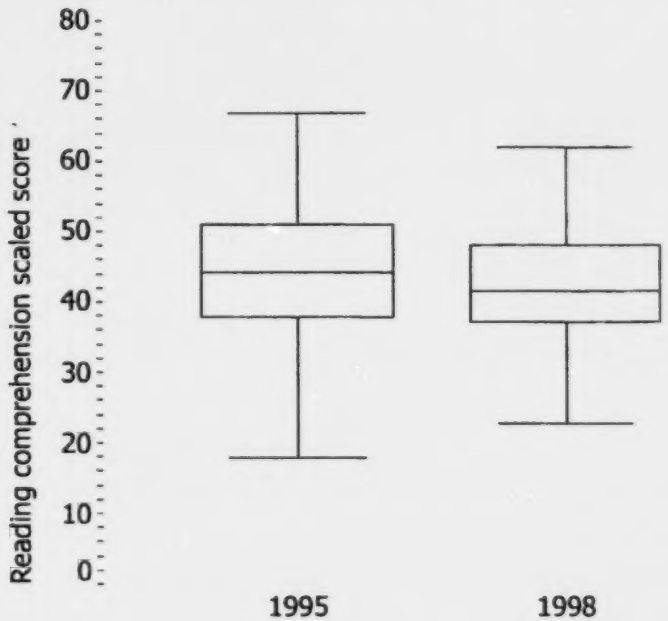



**Figure 7 Distribution of reading comprehension test scores among Indigenous Australian students (full cohort), 1995-1998**

**Summary**

This chapter presented results of the reading comprehension tests administered to each of the five cohorts from 1975 to 1998, as part of other studies. Results were presented as mean scores, median scores and score distributions for three subgroups: full cohort, 14-year-old students, and 14-year-olds in Year 9. Among the full cohort and the subgroup of 14-year-olds in Year 9, the mean scores in 1998 were lower than the mean scores in 1975. Among the subgroup of 14-year-old students, the mean score in 1998 was the same as it was in 1975. During this period, there was little change in the proportion of students who obtained a scaled score below 40 or a score of 50 and above.

Between 1975 and 1998, there were changes in the mean reading comprehension scores and the distributions of scores for groups of students, and in the differences between groups.

- Mean scores for female students were significantly higher than mean scores for male students for all cohorts. The difference of about 1.0 scaled score point in 1975 increased to 2.0 points in 1998. There was little change in the proportions of males with scores below 40 or scores of 50 and above, but there were fewer females with scores below 40 and more with scores of 50 and above.

- Achievement scores on the tests of reading comprehension improved over the period for students whose main language was not English. Mean scores increased by 3.0 scaled score points for the subgroup of 14-year-olds from homes where a language other than English is the main language spoken; the proportion of these students with scores of 50 and above increased from 29 per cent to 39 per cent; and the proportion with scores below 40 decreased from 38 per cent to 27 per cent.

- The mean score for students with parents in the professional/managerial group (occupational group I) decreased over the period, but the distributions have been relatively constant. For students with parents in the production/labourers group (occupational group IV), there has been little change in the mean score or in the distributions. Across the 1975, 1989, 1995 and 1998 cohorts, all differences in the means between groups I and IV were statistically significant.

- Mean scores and distributions for student location showed little change over the period. Differences by location were small and not significant across all cohorts.

- The mean score for Indigenous Australian students was lower in 1998 than in 1995, but the difference was not statistically significant. Differences between Indigenous students' mean scores and non-Indigenous students' mean scores were statistically significant.

## 4. TRENDS IN NUMERACY

Achievement in numeracy, like achievement in literacy, has been assessed in the ASSP studies in 1975 and 1980, and as part of the transition studies, YIT 1989, LSAY 1995 and LSAY 1998. Numeracy has been measured with tests of mathematics developed by ACER, with items common across all tests. Table 8 presents mean scores and standard errors on these tests. The following sections of this chapter examine trends in achievement on these tests for different groups of students. Multivariate analyses, describing how the influence of selected background characteristics has changed over the period, are presented in Chapter 5.

**Table 8 Means and standard errors, medians, and distribution of scaled scores on mathematics tests, 1975-1998**

| | Scaled score | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|
| | Mean (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | |
| ASSP 1975 | 50.1 (0.34) | 52.0 | 5% | 13% | 30% | 30% | 22% |
| ASSP 1980 | 51.2 (0.39) | 52.8 | 4% | 12% | 30% | 23% | 30% |
| YIT 1989 | 49.2 (0.35) | 49.9 | 4% | 16% | 37% | 26% | 18% |
| LSAY 1995 | 50.3 (0.25) | 49.0 | 1% | 9% | 42% | 35% | 13% |
| LSAY 1998 | 50.2 (0.26) | 49.8 | 1% | 11% | 44% | 31% | 13% |
| **14-year-old students** | | | | | | | |
| ASSP 1975 | 50.1 (0.34) | 52.0 | 5% | 13% | 30% | 30% | 22% |
| ASSP 1980 | 51.2 (0.39) | 52.8 | 4% | 12% | 30% | 23% | 30% |
| YIT 1989 | 49.2 (0.35) | 49.9 | 4% | 16% | 37% | 26% | 18% |
| LSAY 1995 | 50.6 (0.26) | 49.0 | 1% | 8% | 42% | 36% | 13% |
| LSAY 1998 | 50.5 (0.26) | 49.8 | 0% | 10% | 45% | 32% | 13% |
| **14-year-olds in year 9** | | | | | | | |
| ASSP 1975 | 52.2 (0.30) | 52.0 | 3% | 9% | 29% | 33% | 26% |
| ASSP 1980 | 52.6 (0.37) | 52.8 | 2% | 9% | 30% | 26% | 33% |
| YIT 1989 | 50.3 (0.36) | 49.9 | 2% | 13% | 37% | 28% | 19% |
| LSAY 1995 | 50.6 (0.26) | 49.0 | 1% | 8% | 42% | 36% | 13% |
| LSAY 1998 | 50.5 (0.26) | 49.8 | 0% | 10% | 45% | 32% | 13% |

Mean scaled scores on the mathematics test have fluctuated between 1975 and 1998 among the three subgroups, with the highest mean occurring in 1980 and the lowest in 1989. Among the full cohort, the mean score in 1998 was 0.1 scaled score point higher than in 1975; this difference is not statistically significant. Among 14-year-old students, the mean score in 1998 was 0.4 points higher than in 1975, but this difference is also not statistically significant. Among 14-year-olds in Year 9, the mean score in 1998 was 1.7 points lower than in 1975, and statistically significant ($p<.001$).

During this period, there has been a narrowing in the distribution of scores, as shown in Figure 8. Among the 14-year-old students subgroup of the 1975 cohort, 18 per cent had scores below 40; in the 1998 cohorts, the proportion was reduced to 10 per cent. The proportion who scored 50 or above also reduced during this period, from 52 per cent in 1975 to 45 per cent in 1998. Even though there were fewer students scoring at the highest levels, the mean score among 14-year-old students was higher in 1998 than in 1975. Distributions among the full cohort showed similar changes over the period.

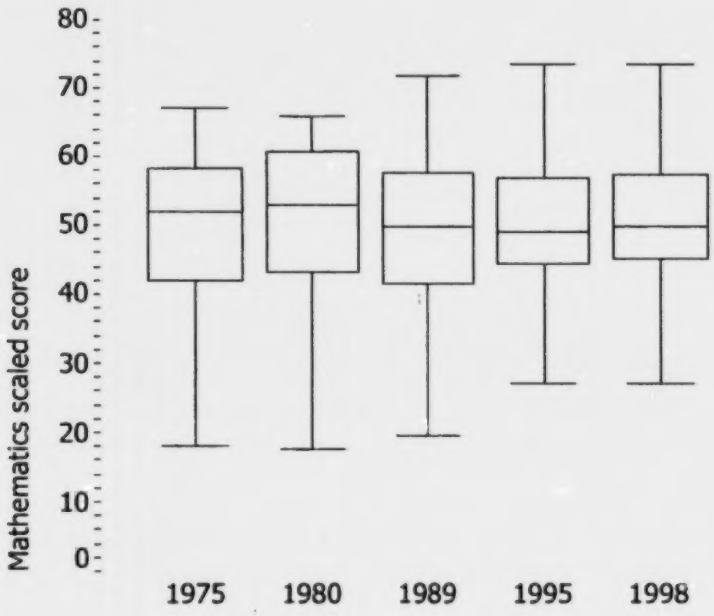



**Figure 8 Distribution of mathematics test scores among 14-year-old students, 1975-1998**

**Trends in Numeracy for Groups of Students**

*Gender*

As noted above, mean scores on the mathematics tests fluctuated over the period from 1975 to 1998, with the 1989 Youth in Transition cohort having noticeably lower mean scores than the other cohorts. When the data are separated by gender, this fluctuation is repeated for male and female students separately (see Table 9). Among the full cohorts, male students' (50.7) and female students' (49.6) mean scores in 1998 were the same as their mean scores in 1975. Among the subgroup of 14-year-old students, the mean for males increased by 0.6 scaled score points between 1975 and 1998, and the mean for females increased by 0.2. Neither of these increases was statistically significant. Among 14-year-olds in Year 9, the mean score for males decreased by 1.5 scaled score points between 1975 and 1998, and by 1.7 points for females, both of which were statistically significant ($p<.001$).

In 1975, the mean score on the mathematics test for male students was 1.1 scaled score points higher than the mean for female students among the full cohort and the 14-year-old students, and 1.3 points higher among 14-year-olds in Year 9. In 1989, the difference between males and females had fallen among all subgroups, but in 1995 the difference increased to 1.7 among the full cohort, and 1.5 among 14-year-old students and 14-year-olds in Year 9. The mean numeracy scores for males and females have fluctuated over the period, but there has been little change in the difference between males and females. All gender differences—for all cohorts and among all subgroups—are statistically significant.

**Table 9 Means and standard errors, medians, and distribution of scaled scores on mathematics test, by gender, 1975-1998**

| Males | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 50.7 | (0.49) | 52.0 | 5% | 13% | 27% | 31% | 24% |
| ASSP 1980 | 51.8 | (0.48) | 52.8 | 4% | 11% | 28% | 24% | 33% |
| YIT 1989 | 49.6 | (0.46) | 49.9 | 4% | 16% | 34% | 26% | 20% |
| LSAY 1995 | 51.2 | (0.34) | 51.5 | 1% | 8% | 39% | 35% | 17% |
| LSAY 1998 | 50.7 | (0.31) | 49.8 | 1% | 11% | 41% | 32% | 15% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 50.7 | (0.49) | 52.0 | 5% | 13% | 27% | 31% | 24% |
| ASSP 1980 | 51.8 | (0.48) | 52.8 | 4% | 11% | 28% | 24% | 33% |
| YIT 1989 | 49.6 | (0.46) | 49.9 | 4% | 16% | 34% | 26% | 20% |
| LSAY 1995 | 51.4 | (0.35) | 51.5 | 1% | 8% | 39% | 35% | 17% |
| LSAY 1998 | 51.3 | (0.32) | 49.8 | 1% | 9% | 42% | 34% | 15% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 52.8 | (0.47) | 54.8 | 3% | 8% | 27% | 33% | 29% |
| ASSP 1980 | 53.5 | (0.47) | 56.4 | 3% | 8% | 26% | 27% | 36% |
| YIT 1989 | 50.6 | (0.51) | 52.2 | 3% | 13% | 34% | 28% | 22% |
| LSAY 1995 | 51.4 | (0.35) | 51.5 | 1% | 8% | 39% | 35% | 17% |
| LSAY 1998 | 51.3 | (0.32) | 49.8 | 1% | 9% | 42% | 34% | 15% |

| Females | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | (s.e.) | Median | <30 | 30-40 | 40-50 | 50-60 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 49.6 | (0.35) | 49.5 | 5% | 13% | 34% | 30% | 19% |
| ASSP 1980 | 50.5 | (0.46) | 49.9 | 4% | 13% | 33% | 23% | 27% |
| YIT 1989 | 48.8 | (0.45) | 49.9 | 3% | 16% | 40% | 25% | 16% |
| LSAY 1995 | 49.5 | (0.27) | 49.0 | 1% | 10% | 44% | 36% | 10% |
| LSAY 1998 | 49.6 | (0.33) | 49.8 | 1% | 12% | 47% | 30% | 11% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 49.6 | (0.35) | 49.5 | 5% | 13% | 34% | 30% | 19% |
| ASSP 1980 | 50.5 | (0.46) | 49.9 | 4% | 13% | 33% | 23% | 27% |
| YIT 1989 | 48.8 | (0.45) | 49.9 | 3% | 16% | 40% | 25% | 16% |
| LSAY 1995 | 49.9 | (0.28) | 49.0 | 0% | 9% | 44% | 37% | 10% |
| LSAY 1998 | 49.8 | (0.34) | 49.8 | 0% | 11% | 48% | 31% | 11% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 51.5 | (0.35) | 52.0 | 2% | 10% | 31% | 33% | 23% |
| ASSP 1980 | 51.8 | (0.44) | 52.8 | 2% | 11% | 33% | 25% | 29% |
| YIT 1989 | 49.9 | (0.47) | 49.9 | 1% | 14% | 39% | 28% | 17% |
| LSAY 1995 | 49.9 | (0.28) | 49.0 | 0% | 9% | 44% | 37% | 10% |
| LSAY 1998 | 49.8 | (0.34) | 49.8 | 0% | 11% | 48% | 31% | 11% |

*Language Background*

Information on students' language background was not collected in 1989, so information on language spoken at home is not included for this cohort. Without the YIT 1989 cohort, there are not the fluctuations in mean mathematics score as seen in Table 8 and Table 9 above. For students from homes where English is the main language spoken, there was an increase in the mean from 1975 to 1980, a decrease from 1980 to 1995, and no change from 1995 to 1998. There is no statistically significant difference between the mean for 1975 and the mean for 1998. For students from homes where a language other than English is the main language spoken, there were increases for each cohort and among each subgroup; the 3.8 scaled score point difference between 1975 and 1998 was statistically significant ($p$=.006)

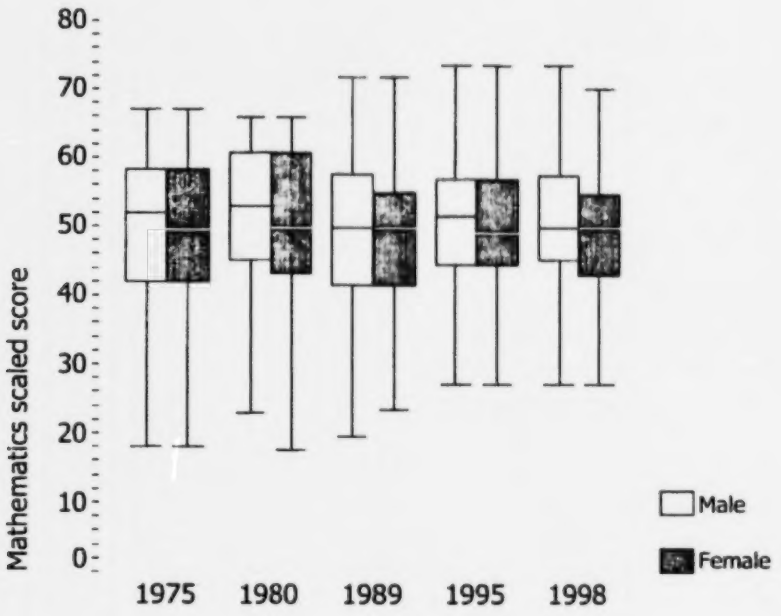



**Figure 9** **Distribution of mathematics test scores among 14-year-old students, by gender, 1975-1998**

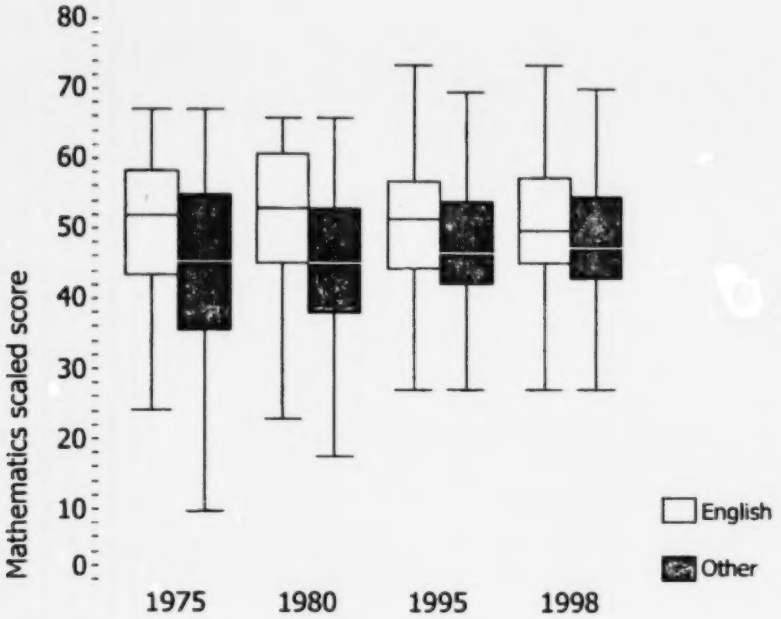



**Figure 10** **Distribution of mathematics test scores among 14-year-old students, by language background, 1975-1998**

In 1975, 30 per cent of 14-year-old students from homes where a language other than English was the main language spoken had mathematics test scores below 40; in 1998, only 15 per cent had scores in that range. The proportion with scores of 50 and above also decreased between 1975 and 1998, from 38 per cent to 35 per cent.

In 1975, students from homes where English was the main language spoken had a mean score in mathematics that was 5.6 scaled score points higher than the mean for students from homes where another language was the main language spoken. The difference increased to more than 6 points in 1980, but since then it has decreased to approximately 2 points in 1998. Although the difference in mean scores has decreased, the differences for all cohorts and among all subgroups are statistically significant ($p<.001$).

**Table 10 Means and standard errors, medians, and distribution of scaled scores on mathematics tests, by language background, 1975-1998**

| English | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 50.4 | (0.34) | 52.0 | 4% | 13% | 30% | 30% | 22% |
| ASSP 1980 | 51.7 | (0.36) | 52.8 | 4% | 11% | 30% | 24% | 31% |
| LSAY 1995 | 50.6 | (0.23) | 49.0 | 1% | 8% | 41% | 36% | 14% |
| LSAY 1998 | 50.6 | (0.25) | 49.8 | 1% | 10% | 43% | 32% | 13% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 50.4 | (0.34) | 52.0 | 4% | 13% | 30% | 30% | 22% |
| ASSP 1980 | 51.7 | (0.36) | 52.8 | 4% | 11% | 30% | 24% | 31% |
| LSAY 1995 | 50.8 | (0.25) | 51.5 | 1% | 8% | 41% | 37% | 14% |
| LSAY 1998 | 50.8 | (0.25) | 49.8 | 0% | 9% | 44% | 33% | 13% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 52.4 | (0.30) | 54.8 | 2% | 9% | 28% | 34% | 26% |
| ASSP 1980 | 53.1 | (0.35) | 52.8 | 2% | 9% | 29% | 26% | 34% |
| LSAY 1995 | 50.8 | (0.25) | 51.5 | 1% | 8% | 41% | 37% | 14% |
| LSAY 1998 | 50.8 | (0.25) | 49.8 | 0% | 9% | 44% | 33% | 13% |

| Language other than English | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 44.8 | (1.12) | 41.9 | 14% | 16% | 33% | 26% | 12% |
| ASSP 1980 | 45.3 | (1.13) | 45.2 | 10% | 23% | 36% | 16% | 15% |
| LSAY 1995 | 48.1 | (0.62) | 46.7 | 1% | 15% | 46% | 29% | 10% |
| LSAY 1998 | 48.5 | (0.56) | 47.4 | 1% | 15% | 49% | 25% | 10% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 44.8 | (1.12) | 41.9 | 14% | 16% | 33% | 26% | 12% |
| ASSP 1980 | 45.3 | (1.13) | 45.2 | 10% | 23% | 36% | 16% | 15% |
| LSAY 1995 | 48.0 | (0.59) | 46.7 | 1% | 15% | 46% | 28% | 10% |
| LSAY 1998 | 48.6 | (0.57) | 47.4 | 1% | 14% | 50% | 25% | 10% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 46.8 | (1.72) | 47.3 | 10% | 11% | 39% | 26% | 14% |
| ASSP 1980 | 46.6 | (0.99) | 47.3 | 5% | 21% | 40% | 22% | 13% |
| LSAY 1995 | 48.0 | (0.59) | 46.7 | 1% | 15% | 46% | 28% | 10% |
| LSAY 1998 | 48.6 | (0.57) | 47.4 | 1% | 14% | 50% | 25% | 10% |

*Family Occupational Groups*

Information on mathematics achievement by family occupational background is presented in Table 11. As noted in the chapter on literacy results, this information was not collected in 1980; for all other cohorts, parents' occupations were categorised into four broad groups. Among the full cohort and 14-year-old students subgroups, mean scores for students with parents in the professional/managerial group (occupational group I) decreased from 53.9 in 1975 to 52.9 in 1989, but have been relatively stable since then. Among 14-year-olds in Year 9, the mean for students with parents in the professional/managerial group decreased from 1975 to 1989, and again to 1995, but remained relatively stable for 1998. The difference between 1975 and 1998 is statistically significant among all subgroups ($p<.001$).

For students with parents in the clerical/sales/service group (occupational group II), mean scores decreased from 1975 to 1989, then increased to 1995 and remained stable for 1998. Students with parents in the trades group (occupational group III) show a pattern similar to that for students with parents in the professional/managerial group. For this group, mean mathematics scores decreased from 1975 to 1989, and have been relatively stable to 1998.

**Table 11 Means and standard errors, medians, and distribution of scaled scores on mathematics tests, by family occupational group, 1975-1998**

| Occupational | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| Group I | Mean | (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 53.9 | (0.41) | 54.8 | 2% | 6% | 26% | 36% | 30% |
| YIT 1989 | 52.9 | (0.41) | 52.2 | 1% | 9% | 31% | 32% | 28% |
| LSAY 1995 | 52.8 | (0.27) | 51.5 | 0% | 5% | 34% | 42% | 18% |
| LSAY 1998 | 52.8 | (0.32) | 52.2 | 0% | 7% | 36% | 37% | 19% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 53.9 | (0.41) | 54.8 | 2% | 6% | 26% | 36% | 30% |
| YIT 1989 | 52.9 | (0.41) | 52.2 | 1% | 9% | 31% | 32% | 28% |
| LSAY 1995 | 53.0 | (0.28) | 54.0 | 0% | 5% | 33% | 43% | 19% |
| LSAY 1998 | 52.9 | (0.32) | 52.2 | 0% | 7% | 36% | 38% | 19% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 55.2 | (0.45) | 54.8 | 1% | 5% | 23% | 38% | 34% |
| YIT 1989 | 53.6 | (0.45) | 54.8 | 0% | 7% | 30% | 33% | 29% |
| LSAY 1995 | 53.0 | (0.28) | 54.0 | 0% | 5% | 33% | 43% | 19% |
| LSAY 1998 | 52.9 | (0.32) | 52.2 | 0% | 7% | 36% | 38% | 19% |

| Occupational | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| Group II | Mean | (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 51.0 | (0.46) | 52.0 | 4% | 12% | 28% | 34% | 23% |
| YIT 1989 | 49.6 | (0.48) | 49.9 | 4% | 12% | 40% | 28% | 17% |
| LSAY 1995 | 50.4 | (0.27) | 49.0 | 0% | 8% | 44% | 35% | 13% |
| LSAY 1998 | 50.2 | (0.31) | 49.8 | 1% | 10% | 45% | 33% | 11% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 51.0 | (0.46) | 52.0 | 4% | 12% | 28% | 34% | 23% |
| YIT 1989 | 49.6 | (0.48) | 49.9 | 4% | 12% | 40% | 28% | 17% |
| LSAY 1995 | 50.3 | (0.33) | 49.0 | 0% | 7% | 46% | 34% | 12% |
| LSAY 1998 | 50.1 | (0.37) | 49.8 | 1% | 9% | 47% | 32% | 11% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 52.6 | (0.50) | 54.8 | 2% | 10% | 26% | 36% | 25% |
| YIT 1989 | 49.8 | (0.57) | 49.9 | 4% | 11% | 37% | 29% | 18% |
| LSAY 1995 | 50.3 | (0.33) | 49.0 | 0% | 7% | 46% | 34% | 12% |
| LSAY 1998 | 50.1 | (0.37) | 49.8 | 1% | 9% | 47% | 32% | 11% |

**Table 11 Means and standard errors, medians, and distribution of scaled scores on mathematics tests, by family occupational group, 1975-1998 (continued)**

| Occupational | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| Group III | Mean | (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 50.8 | (0.42) | 52.0 | 4% | 12% | 32% | 30% | 22% |
| YIT 1989 | 49.4 | (0.45) | 49.9 | 2% | 15% | 40% | 28% | 15% |
| LSAY 1995 | 49.4 | (0.26) | 49.0 | 1% | 9% | 47% | 33% | 10% |
| LSAY 1998 | 49.3 | (0.24) | 47.4 | 0% | 11% | 50% | 29% | 10% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 50.8 | (0.42) | 52.0 | 4% | 12% | 32% | 30% | 22% |
| YIT 1989 | 49.4 | (0.45) | 49.9 | 2% | 15% | 40% | 28% | 15% |
| LSAY 1995 | 49.5 | (0.33) | 49.0 | 1% | 8% | 47% | 34% | 10% |
| LSAY 1998 | 49.6 | (0.30) | 49.8 | 0% | 9% | 51% | 30% | 10% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 52.0 | (0.49) | 52.0 | 4% | 12% | 32% | 30% | 22% |
| YIT 1989 | 50.5 | (0.50) | 49.9 | 2% | 15% | 40% | 28% | 15% |
| LSAY 1995 | 49.5 | (0.33) | 49.0 | 1% | 8% | 47% | 34% | 10% |
| LSAY 1998 | 49.6 | (0.30) | 49.8 | 0% | 9% | 51% | 30% | 10% |

| Occupational | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| Group IV | Mean | (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 48.3 | (0.47) | 49.5 | 6% | 16% | 33% | 29% | 16% |
| YIT 1989 | 46.8 | (0.50) | 47.6 | 5% | 20% | 40% | 23% | 12% |
| LSAY 1995 | 48.6 | (0.32) | 49.0 | 1% | 11% | 48% | 31% | 9% |
| LSAY 1998 | 47.8 | (0.26) | 47.4 | 1% | 14% | 53% | 26% | 6% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 48.3 | (0.47) | 49.5 | 6% | 16% | 33% | 29% | 16% |
| YIT 1989 | 46.8 | (0.50) | 47.6 | 5% | 20% | 40% | 23% | 12% |
| LSAY 1995 | 48.8 | (0.40) | 49.0 | 1% | 12% | 45% | 33% | 9% |
| LSAY 1998 | 48.3 | (0.29) | 47.4 | 0% | 13% | 54% | 27% | 7% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 50.2 | (0.59) | 52.0 | 4% | 11% | 32% | 32% | 21% |
| YIT 1989 | 48.0 | (0.56) | 47.6 | 3% | 18% | 39% | 28% | 12% |
| LSAY 1995 | 48.8 | (0.40) | 49.0 | 1% | 12% | 45% | 33% | 9% |
| LSAY 1998 | 48.3 | (0.29) | 47.4 | 0% | 13% | 54% | 27% | 7% |

*Note.* Group I includes managers and administrators, professionals and associate professionals. Group II includes clerical, sales and service workers. Group III includes tradespersons and related workers. Group IV includes intermediate production and transport workers, and labourers and related workers.

The group of students with parents employed as production workers and labourers (occupational group IV) is the only group to follow the pattern of decreases and increases noted for all students, males and females, and metropolitan and non-metropolitan students on the mathematics tests. Among 14-year-old students, the mean mathematics score has fluctuated over the period, but the mean in 1998 (48.3) was the same as it was in 1975.

During the period under study, the distributions of scores have changed for the four occupational groups. Among 14-year-olds, 66 per cent in occupational group I had scores of 50 or above in 1975; 55 per cent had scores of 50 or above in 1998. In 1975, 8 per cent had scores below 40, and in 1998, 7 per cent did. For those whose parents were in occupational group IV, the proportion of 14-year-olds with scores of 50 or above dropped from 45 per cent to 34 per cent between 1975 and 1998, and the proportion with scores below 40 dropped from 22 per cent to 13 per cent. Among 14-year-old students from occupational groups II and III, the changes between 1975 and 1998 were similar to the changes for group IV—decreases in the proportion scoring at both 50 and above and below 40.

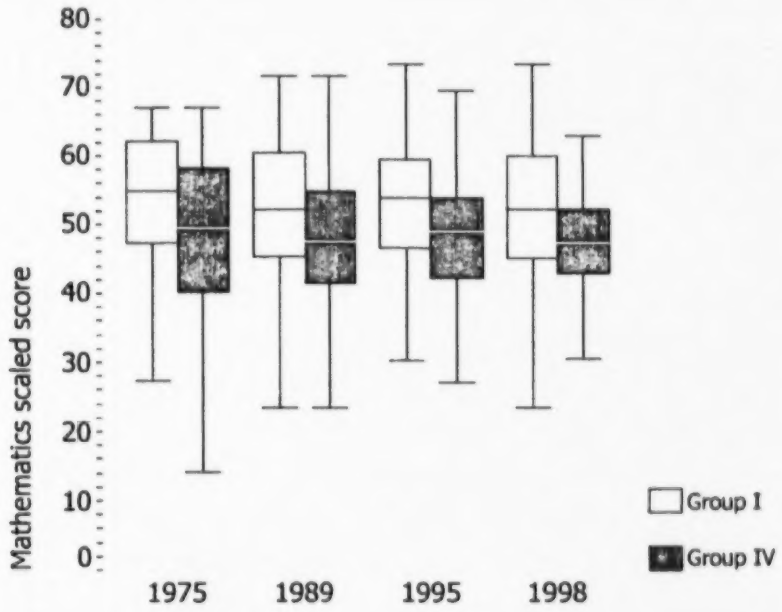



**Figure 11 Distribution of mathematics test scores among 14-year-old students from professional and managerial (occupational group I) families and labourers and related workers (occupational group IV) families, 1975-1998**

The box-and-whisker plots in Figure 11 show the changes in the distributions among 14-year-old students from families in occupational groups I and IV. For group I students in 1975, the lower whisker, representing the lower 25 per cent of scores, was much longer than the upper whisker, indicating that there was a greater concentration of students at the upper end of the distribution. In 1998, the box for group I was about the same size as the box in 1975, but the whiskers were longer at both ends, indicating a wider distribution of scores. For group IV students, the distribution has narrowed, as indicated by the much smaller box in 1998. In 1975, the 75$^{th}$ percentile for group IV students, as indicated by the top of the box, was between the median and the top of the box for group I; in 1998, the top of the group IV box was at the median for group I. Even though the median and distribution for group IV students narrowed between 1975 and 1998, the mean score remained the same, as the percentage of students in the lower score ranges decreased during that period.

In all four cohorts with data on parents' occupations, students from family occupational group I (professional/managerial) had the highest mean scores, and students from family occupational group IV (production/labourers) had the lowest. Among all subgroups, these differences were statistically significant ($p<.001$).

*Geographic Location*

For students from non-metropolitan locations, mean scores on the mathematics tests fluctuated between 1975 and 1998. In 1998, the mean score of 49.7 among the full cohort was only slightly higher than in 1975 (49.5). Among 14-year-old students, the 1998 mean score of 50.1 was higher than the mean in 1975 (49.5), but the difference is not statistically significant. Among the three subgroups, mean scores in 1980 were the highest. Mean scores for students from metropolitan locations also fluctuated during the period, with means in 1975 and 1998 equivalent among the full cohort; among 14-year-old students, the mean in 1998

was 0.4 scaled score points higher than it was in 1975 but not statistically significant. These scores are presented as part of Table 12. The differences in the mean scores between non-metropolitan and metropolitan students were not significant for any cohort among any subgroup.

**Table 12 Means and standard errors, medians, and distribution of scaled scores on mathematics tests, by geographic location, 1975-1998**

| Non-metropolitan | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 49.5 | (0.55) | 52.0 | 6% | 12% | 31% | 30% | 21% |
| ASSP 1980 | 51.1 | (0.50) | 52.8 | 4% | 13% | 29% | 24% | 30% |
| YTT 1989 | 49.3 | (0.41) | 49.9 | 3% | 15% | 38% | 27% | 17% |
| LSAY 1995 | 49.8 | (0.23) | 49.0 | 1% | 9% | 44% | 35% | 11% |
| LSAY 1998 | 49.7 | (0.26) | 49.8 | 1% | 12% | 45% | 31% | 12% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 49.5 | (0.55) | 52.0 | 6% | 12% | 31% | 30% | 21% |
| ASSP 1980 | 51.1 | (0.50) | 52.8 | 4% | 13% | 29% | 24% | 30% |
| YTT 1989 | 49.3 | (0.41) | 49.9 | 3% | 15% | 38% | 27% | 17% |
| LSAY 1995 | 50.2 | (0.27) | 49.0 | 1% | 8% | 43% | 37% | 11% |
| LSAY 1998 | 50.1 | (0.28) | 49.8 | 0% | 10% | 46% | 31% | 12% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 51.8 | (0.51) | 52.0 | 3% | 9% | 29% | 34% | 25% |
| ASSP 1980 | 52.9 | (0.45) | 52.8 | 2% | 9% | 29% | 27% | 33% |
| YTT 1989 | 50.5 | (0.41) | 49.9 | 2% | 12% | 37% | 30% | 19% |
| LSAY 1995 | 50.2 | (0.27) | 49.0 | 1% | 8% | 43% | 37% | 11% |
| LSAY 1998 | 50.1 | (0.28) | 49.8 | 0% | 10% | 46% | 31% | 12% |

| Metropolitan | Scaled score | | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | | |
| ASSP 1975 | 50.5 | (0.42) | 52.0 | 4% | 13% | 30% | 30% | 22% |
| ASSP 1980 | 51.2 | (0.55) | 52.8 | 4% | 12% | 31% | 22% | 30% |
| YTT 1989 | 49.1 | (0.52) | 49.9 | 4% | 16% | 37% | 25% | 18% |
| LSAY 1995 | 50.8 | (0.40) | 51.5 | 1% | 9% | 40% | 36% | 15% |
| LSAY 1998 | 50.5 | (0.38) | 49.8 | 1% | 11% | 43% | 32% | 14% |
| **14-year-old students** | | | | | | | | |
| ASSP 1975 | 50.5 | (0.42) | 52.0 | 4% | 13% | 30% | 30% | 22% |
| ASSP 1980 | 51.2 | (0.55) | 52.8 | 4% | 12% | 31% | 22% | 30% |
| YTT 1989 | 49.1 | (0.52) | 49.9 | 4% | 16% | 37% | 25% | 18% |
| LSAY 1995 | 50.9 | (0.40) | 51.5 | 1% | 8% | 40% | 36% | 15% |
| LSAY 1998 | 50.9 | (0.37) | 49.8 | 1% | 9% | 44% | 32% | 14% |
| **14-year-olds in year 9** | | | | | | | | |
| ASSP 1975 | 52.4 | (0.37) | 54.8 | 2% | 10% | 29% | 33% | 27% |
| ASSP 1980 | 52.4 | (0.53) | 52.8 | 3% | 9% | 31% | 25% | 32% |
| YTT 1989 | 50.1 | (0.53) | 49.9 | 2% | 14% | 37% | 27% | 20% |
| LSAY 1995 | 50.9 | (0.40) | 51.5 | 1% | 8% | 40% | 36% | 15% |
| LSAY 1998 | 50.9 | (0.37) | 49.8 | 1% | 9% | 44% | 32% | 14% |

The proportion of 14-year-old students from non-metropolitan locations with scores below 40 decreased from 18 per cent in 1975 to 10 per cent in 1998. Over the same period, the proportion with scores of 50 and above dropped from 51 per cent to 43 per cent. Distributions for students from metropolitan locations showed similar changes between 1975 and 1998. Among 14-year-old students, the proportion with scores below 40 dropped from 17 per cent to 10 per cent, and the proportion with scores of 50 and above dropped from 52 per cent to 46 per cent.

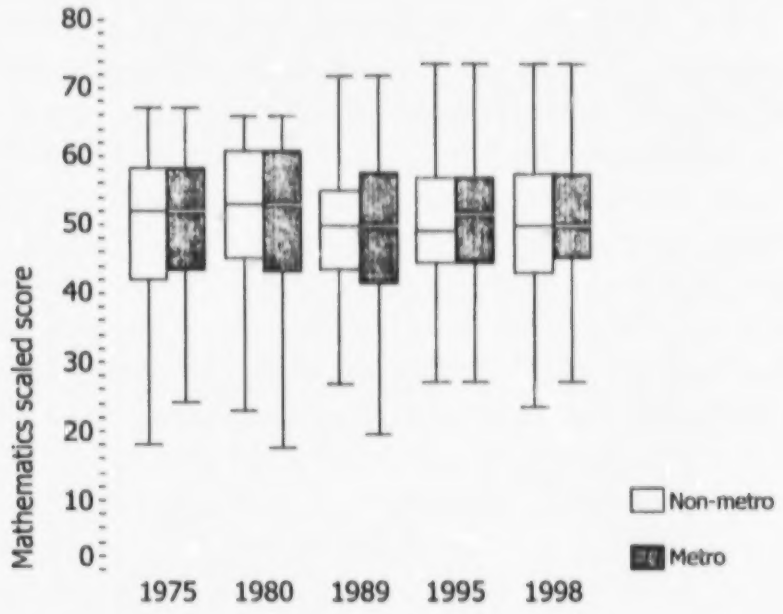



**Figure 12 Distribution of mathematics test scores among 14-year-old students, by geographic location, 1975-1998**

*Indigenous Australians*

In 1995, Indigenous Australian students' mean scaled score on the mathematics tests was 44.8, 5.5 scaled score points lower than the mean for the full cohort. In 1998, the mean for Indigenous students was 44.4, which was 5.8 points lower than the mean for the full cohort. One-fourth of students had scores below 40 in 1995, and one-fourth had scores of 50 and above. In 1998, 29 per cent had scores below 40, and 21 per cent had scores of 50 and above. In both cohorts, one-half of students had scores from 40 to 49, inclusive (see Table 13). There are no comparable data from previous cohorts. The box-and-whisker plots in Figure 13 indicate the distributions of the two cohorts, highlighting the wider distribution in 1998, including the lower median.

**Table 13 Means and standard errors, medians, and distribution of scaled scores on mathematics tests, Indigenous Australian students, 1995-1998**

| | Scaled score | | Percentage of students in scaled score range | | | | |
|---|---|---|---|---|---|---|---|
| | Mean (s.e.) | Median | <30 | 30-39 | 40-49 | 50-59 | 60+ |
| **Full cohort** | | | | | | | |
| LSAY 1995 | 44.8 (0.47) | 44.4 | 2% | 23% | 50% | 21% | 4% |
| LSAY 1998 | 44.4 (0.56) | 42.8 | 4% | 25% | 50% | 17% | 4% |

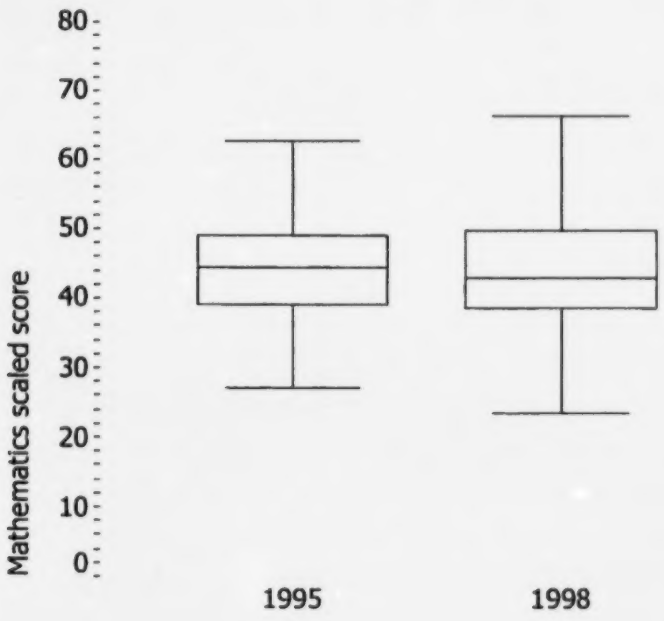



**Figure 13 Distribution of mathematics test scores among Indigenous Australian students (full cohort), 1995-1998**

**Summary**

This chapter presented mean scores, median scores and score distributions for three subgroups on the mathematics tests administered to each of the five cohorts over the period 1975-1998. Among the full cohorts and the subgroup of 14-year-old students, the mean scores in 1998 were marginally, but not significantly higher than the mean scores in 1975. Among the subgroup of 14-year-olds in Year 9, the mean score was 1.7 points lower; this difference was statistically significant. During this period, there was a narrowing of the distributions of scores, with the fewer students achieving scores below 40 and fewer students recording scores of 50 and above.

Between 1975 and 1998, there were changes in the mean mathematics scores and the distributions of scores for groups of students, and in the differences between groups.

- Between 1975 and 1998, the mean scaled score for 14-year-old male students increased by 0.6 points; during the same period, the mean for 14-year-old female students increased by 0.2. For males, the increase was statistically significant. There were decreases in the proportions of males and females who scored below 40, and in the proportions who scored 50 and above. The difference in the means between males and females of about 1.0 scaled score point in 1975 increased to 1.5 points among the subgroups of 14-year-old students and 14-year-olds in Year 9 in 1998. For all cohorts, the differences in means between males and females were statistically significant.

- Achievement on the mathematics tests improved over the period for students whose main language was not English. Mean scores increased by 3.8 scaled score points for the subgroup of 14-year-olds from homes where a language other than English is the main language spoken; this increase was statistically significant. The proportion of

these students with scores below 40 decreased from 30 per cent in 1975 to 15 per cent in 1998.

- The mean mathematics score for students with parents in the professional/managerial group (occupational group I) decreased significantly over the period, and the proportion with scores of 50 and above declined. For students with parents in the production/labourers group (occupational group IV), there was no change in the mean score, a decrease in the proportion with scores below 40, and a decrease in the proportion with scores of 50 and above. For the 1975, 1989, 1995 and 1998 cohorts, differences in the means between groups I and IV were statistically significant.

- Differences by location were small and not significant across all cohorts. There were minor changes in scores and distributions for students from metropolitan and non-metropolitan locations.

- The mean score for Indigenous Australian students was slightly lower in 1998 than in 1995, but the difference was not statistically significant. There was little change over the two cohorts in the distribution of scores. Differences between Indigenous Australian students' mean scores and non-Indigenous students' mean scores were statistically significant.

## 5. INFLUENCES ON ACHIEVEMENT

### Changes in Background Influences on Achievement in Reading Comprehension

This section presents multivariate analyses of the data, concentrating on understanding how student background characteristics and school characteristics work together to influence scores on tests of reading comprehension. The analyses are hierarchical, accounting for the sample design used in these studies and the background and achievement similarities found among students attending the same school. These analyses assist in explaining some of the differences between results for students from different family occupational groups. They also allow examination of changes over time in the influence of a background characteristic, such as language background or gender.

*Cohorts and Data*

As noted in the previous chapters on literacy and numeracy, three of the cohorts—1975, 1995 and 1998—collected information on student gender, main language spoken at home, parent occupation and location. The 1980 cohort did not provide information on parent occupation, and the 1989 cohort did not provide information on language background. For these reasons the main analysis uses data from the earliest cohort (ASSP 1975) and the two latest cohorts (LSAY 1995 and 1998). For reasons noted in Chapter 2, these analyses use only the subgroup of 14-year-old students. Analyses were conducted with limited data for the ASSP 1980 and YIT 1989 cohorts, and details of these models are provided in Appendix 2.

*Student-level Influences*

The influence of each variable in the multivariate analyses is shown in Table 14. The tests for each cohort were equated, so it is possible to compare the influence of each variable across the cohorts. For example, in 1975 the value of the estimate of gender's influence was 0.598, with a standard error of 0.332. The associated *p*-value of .071 indicates that this estimate is not statistically significant ($\alpha = .05$), suggesting that when the other variables in the model are held constant, there was no significant difference between males and females on tests of reading comprehension in 1975. In 1995 and 1998, however, the estimates for gender were 1.502 and 1.614, respectively, and they were significant ($p<.001$), indicating that females scored 1.5 points higher than males in 1995 and 1.6 points higher in 1998, holding all other variables constant.

Between 1975 and 1998, the magnitude of the estimate for language background decreased from –5.005 to –2.599, indicating a decrease by about one-half in the difference between students from homes where English is the main language spoken and students from homes where a language other than English is the main language spoken. During this period and within the ASSP and LSAY samples, the percentage of 14-year-olds from other-language backgrounds attending government schools more than doubled, from 4.4 per cent to 10.7 per cent. This stability shows that schools have been able to maintain standards in reading comprehension while enrolling students from other language backgrounds. For all three cohorts, location was not significant, indicating that mean reading comprehension scores for students from non-metropolitan locations were equivalent to scores for students from metropolitan locations when all other variables in the model are held constant.

In their examination of these data and data from other, smaller studies in the LSAY series, Marks and Ainley (1997) noted that the influence of socioeconomic status had declined over the period from 1975 to 1995, because the difference between mean scores for students from occupational group I families and mean scores for students from occupational group IV families had declined. This is seen in Table 14, in the row for the variable for occupational group I. In 1975, it had an estimate of 3.705 and was highly significant ($p<.001$); in 1995, the

parameter estimate was 1.753, also highly significant ($p<.001$). During the same period, estimates for occupational group II, which measures the difference between group II and group IV, and estimates for occupational group III, which measures the difference between groups III and IV, also declined, becoming non-significant in 1995. In 1998, this had changed: the estimate for occupational group I increased to 2.605 ($p<.001$) and the estimate for occupational group II increased to 1.239 ($p=.002$), but the estimate (0.583) for occupational group III was still non-significant ($p=.084$).

**Table 14 Results of multivariate analyses for reading comprehension tests, 1975, 1995 and 1998**

| | 1975 | | | 1995 | | | 1998 | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Estimate** | **s.e.** | **p-value** | **Estimate** | **s.e.** | **p-value** | **Estimate** | **s.e.** | **p-value** |
| **Student level** | | | | | | | | | |
| Intercept | 51.637 | | | 50.604 | | | 51.142 | | |
| Female | 0.598 | 0.332 | 0.071 | 1.502 | 0.239 | <0.001 | 1.614 | 0.240 | <0.001 |
| Metropolitan | 0.251 | 0.559 | 0.653 | 0.239 | 0.342 | 0.485 | 0.059 | 0.330 | 0.859 |
| Other language | -5.005 | 0.700 | <0.001 | -3.462 | 0.427 | <0.001 | -2.599 | 0.409 | <0.001 |
| Occ group I | 3.705 | 0.391 | <0.001 | 1.753 | 0.316 | <0.001 | 2.605 | 0.310 | <0.001 |
| Occ group II | 2.135 | 0.424 | <0.001 | 0.522 | 0.375 | 0.164 | 1.239 | 0.401 | 0.002 |
| Occ group III | 1.630 | 0.419 | <0.001 | -0.067 | 0.348 | 0.848 | 0.583 | 0.337 | 0.084 |
| **School level** | | | | | | | | | |
| % other lang. | -0.104 | 0.035 | 0.003 | -0.043 | 0.014 | 0.004 | -0.039 | 0.014 | 0.004 |
| % occ. group I | 0.015 | 0.017 | 0.367 | 0.083 | 0.012 | <0.001 | 0.102 | 0.012 | <0.001 |
| % occ.group IV | -0.118 | 0.024 | <0.001 | -0.050 | 0.018 | 0.006 | -0.023 | 0.020 | 0.243 |

*Notes*: Results for the intervening cohorts—1980 and 1989—are included in Appendix 2, Table A 6. These results were not included here because the full complement of variables could not be included in the models. 'Base' student is male, non-metropolitan, English-language background, from occupational group IV family.

*School-level Influences*

Between 1975 and 1998, there were changes in the estimates for the percentage of students in the school whose parents were in occupational group I, the variable that measures a school's socioeconomic status. The estimate of 0.015 was not significant in 1975 ($p=.367$); in 1995, at 0.083, it was significant ($p<.001$); and in 1998, at 0.102, it was also significant ($p<.001$). It was noted in the section on student-level variables that the influence of a student's socioeconomic status, as measured by the difference between occupational group I and occupational group IV, declined between 1975 and 1995, although it did remain statistically significant. During the same period, however, the school-level measure of socioeconomic status *increased*, becoming statistically significant in 1995 and increasing in value in 1998.

During the same period, the estimates for the percentage of students in the school whose parents were in occupational group IV, the variable that measures a school's socioeconomic disadvantage, declined, having been statistically significant in 1975 but not in 1995 or 1998.

In all three cohorts, the parameter estimate for the proportion of students in the school who came from homes where a language other than English was the main language spoken was statistically significant, although it decreased in magnitude from –0.104 to –0.039. With the finding that the parameter estimate for the corresponding student-level variable also decreased over the same period, this is a strong indication that as a group, students from homes where English is not the main language spoken have improved their achievement in reading comprehension.



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**Changes in Background Influences on Achievement in Mathematics**

This section presents multivariate analyses of the data on mathematics achievement. As with the reading comprehension data, the analyses are hierarchical, accounting for the sample design used in these studies and the similarities in background and achievement found among students attending the same school.

*Student-level Influences*

The influence of each variable in the multivariate analyses is shown in Table 15. The tests for each cohort were equated, so it is possible to compare the influence of each variable on mathematics test performance across the cohorts. In 1975, gender had an estimate of -1.135 and a standard error of 0.367. This is significant at the .05 level ($p$=.002), suggesting that when the other variables in the model are held constant, there was a significant difference between males and females on tests of mathematics in 1975, with females scoring 1.135 points lower than males, on average. In 1995 and 1998, the estimates for females were -1.720 and -2.060, respectively, and both were statistically significant ($p$<.001), indicating that the difference between males and females in their performance on the mathematics tests increased over time.

**Table 15 Results of multivariate analyses for mathematics tests, 1975, 1995 and 1998**

| | 1975 | | | 1995 | | | 1998 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Estimate | s.e. | p-value | Estimate | s.e. | p-value | Estimate | s.e. | p-value |
| **Student level** | | | | | | | | | |
| Intercept | 50.861 | | | 50.806 | | | 50.864 | | |
| Female | -1.135 | 0.367 | 0.002 | -1.720 | 0.239 | <0.001 | -2.060 | 0.233 | <0.001 |
| Metropolitan | 0.818 | 0.587 | 0.164 | 0.386 | 0.359 | 0.282 | 0.162 | 0.348 | 0.641 |
| Other language | -2.978 | 0.774 | <0.001 | -1.071 | 0.426 | 0.012 | -1.136 | 0.397 | 0.005 |
| Occ group I | 4.442 | 0.433 | <0.001 | 2.243 | 0.315 | <0.001 | 2.376 | 0.301 | <0.001 |
| Occ group II | 2.121 | 0.468 | <0.001 | 0.658 | 0.374 | 0.078 | 1.294 | 0.390 | 0.001 |
| Occ group III | 1.957 | 0.463 | <0.001 | 0.462 | 0.347 | 0.184 | 0.762 | 0.328 | 0.020 |
| **School level** | | | | | | | | | |
| % other lang. | -0.095 | 0.036 | 0.009 | -0.041 | 0.016 | 0.009 | -0.015 | 0.015 | 0.324 |
| % occ. group I | 0.036 | 0.018 | 0.043 | 0.096 | 0.013 | <0.001 | 0.108 | 0.014 | <0.001 |
| % occ.group IV | -0.066 | 0.025 | 0.009 | -0.041 | 0.020 | 0.039 | -0.004 | 0.022 | 0.858 |

*Note*: Results for the intervening cohorts—1980 and 1989—are included in Appendix 2, Table A 7. These results were not included here because the full complement of variables could not be included in the models.

Marks and Ainley (1997) noted that the difference between mean scores for occupational group I and for occupational group IV had declined between 1975 and 1995, in both the descriptive summary statistics and their multivariate analysis. This is seen in Table 15, in the row for occupational group I. In 1975, this variable had a parameter estimate of 4.442, which was highly significant ($p$<.001); in 1995, the parameter estimate was 2.243, also highly significant ($p$<.001). During the same period, estimates for occupational group II, which measures the difference between group II and group IV, and for occupational group III, which measures the difference between group III and group IV, also declined, becoming non-significant in 1995. In 1998, these trends had changed: the estimate for occupational group I increased slightly to 2.376 ($p$<.001), the estimate for occupational group II increased to 1.294 ($p$=.001), and the estimate for occupational group III increased to 0.762 ($p$=.020). This result for parent occupational group shows that the decrease in the difference between occupational groups, seen between 1975 and 1995, has not continued in mathematics.

Between 1975 and 1998, the magnitude of the parameter estimate for other language speakers decreased from -2.978 to -1.136, indicating a decrease of more than one-half in the difference between students from homes where English is the main language spoken and students from

homes where a language other than English is the main language spoken. A similar decrease in the effects of language background was seen in reading comprehension. For all three cohorts, the location variable was not significant, indicating that mean mathematics scores for students from metropolitan locations were equivalent to scores for students from non-metropolitan locations when all other variables in the model are held constant.

*School-level Influences*

During the period 1975-1998, estimates for mathematics for the percentage of students in the school whose parents were in occupational group I changed, as they did for reading comprehension. The parameter estimate of 0.036 was significant in 1975 ($p$=.043); in 1995, at 0.096, it was highly significant ($p$<.001); and in 1998, at 0.108, it was also highly significant ($p$<.001). It was noted above that the influence of an individual student's socioeconomic status, as measured by the difference between occupational group I and occupational group IV, declined between 1975 and 1995. Across the three cohorts, the school-level measure of socioeconomic status was statistically significant and increased during the period. This result for mathematics is similar to the result for reading comprehension. The magnitude of the measure of socioeconomic disadvantage—the percentage of students in the school with parents in occupational group IV—declined over the period and was not significant in 1998.

In 1975 and 1995, the parameter estimate for the proportion of students in the school who came from homes where a language other than English was the main language spoken was statistically significant, although it decreased in magnitude from –0.095 ($p$=.009) to –0.041 ($p$=.009). In 1998, this school-level variable was not significant. With the finding that the parameter estimate for the corresponding student-level variable also decreased over the same period, this is a strong indication that as a group, students from homes where English is not the main language have improved their level of achievement in mathematics, as shown for their achievement in reading comprehension.

## 6. DISCUSSION

The previous chapters of this report have presented data on literacy and numeracy achievement from 1975 to 1998, providing summaries of scores on tests of reading comprehension and mathematics of school students who participated in major studies. In 1975 and 1980, these students were part of the Australian Studies in School Performance and the Australian Studies of Student Performance, respectively, which concentrated on the academic achievements of 14-year-olds. Students in later studies participated in longitudinal surveys examining transitions from school. In 1989, participants were 14 years old and part of the Youth in Transition studies. For the LSAY 1995 and 1998 studies, students were selected because they were enrolled in Year 9. Because of the differences in how the samples were drawn, three sets of scores were reported for each cohort: the full cohort, 14-year-old students, and 14-year-olds in Year 9.

Across the five studies, the tests that were administered to participants used a number of items that were common to all cohorts, allowing the results to be placed on a common scale. For this report, scores were equated to a scale with a mean of 50 and standard deviation of 10, allowing comparisons across all studies. Results were reported as mean scaled scores across the cohorts, with separate tables allowing comparisons by background factors of gender, main language spoken at home, family occupational group and geographic location. Results for reading comprehension were presented in Chapter 3; results for mathematics, in Chapter 4. Tables also showed the distributions of scores, grouped in score ranges determined by the mean and standard deviations. Multivariate analyses were used to understand the relationships between background factors and achievement, and to examine the results from three years: 1975, 1995 and 1998. These analyses for both reading comprehension and mathematics were reported in Chapter 5. The remainder of this chapter discusses the trends reported, followed by a discussion of the implications of the findings.

### Overall trends

There was little change in scores in reading comprehension between 1975 and 1998 among the subgroup of 14-year-old students, although there was a small, statistically significant decrease among the full cohorts. During the same period, there was a small increase in the mean score in mathematics among 14-year-olds, but this increase was not statistically significant, and no increase among the full cohorts. In the United States, findings from the National Assessment of Educational Progress (NAEP) noted that 13-year-olds showed a 'modest' increase in reading scores between 1975 and 1999, and a stronger increase in mathematics during the same period (National Center for Education Statistics [NCES], 2000). In general, the findings reported here are consistent with findings for American students over the same period.

Among the 14-year-olds in Year 9, there were statistically significant decreases in both reading comprehension and mathematics. As noted in the discussion of data and methods in Chapter 2, the group of 14-year-olds in Year 9 in the earlier cohorts may have been of higher ability, because of school-entry and grade retention policies and practices; the decline in scores noted here are more likely a reflection of changing enrolment and promotion practices in individual States and Territories than of changing achievement levels in reading comprehension and mathematics.

Female 14-year-old students scored 0.5 points higher in reading comprehension in 1998 than they did in 1975, and male 14-year-old students scored 0.6 lower. For both genders, these differences were statistically significant. As a result, the difference between males and females in reading comprehension scores increased from 0.9 in 1975 to 2.0 in 1998. In all cohorts, the difference between 14-year-old males and females in reading comprehension was statistically significant. The multivariate analysis in Chapter 5 showed a non-significant

gender difference in reading comprehension in 1975, when all other variables were considered, but an increase in the differences in 1995 and 1998. In mathematics, 14-year-old male students increased their mean score by 0.6 points between 1975 and 1998, and female students increased theirs by 0.2. In both 1975 and 1998, the differences between males and females were statistically significant. This was noted in both Chapters 4 and 5.

Similar gender differences were identified in trends in NAEP among 13-year-olds in the United States, with females scoring higher on tests of reading comprehension and males scoring higher on tests of mathematics (NCES, 2000). International studies of academic achievement, however, indicated no gender differences in mathematics among Australian 13-year-olds or 15-year-olds. The differences in reported results of literacy and numeracy achievement—between results in this report and results from TIMSS (Mullis, *et al*, 2000) and PISA (OECD, 2001)—may be the result of differences in the assessments used, and should be recognised as variations at this time.

There were large increases in achievement among students for whom the main language spoken at home was a language other than English. In reading comprehension, 14-year-old students with language backgrounds other than English improved their mean by 3.0 scaled score points between 1975 and 1998, while English-language background students maintained their mean score. In mathematics, 14-year-olds from other language backgrounds improved their mean by 3.8 points, while English-language background students increased their mean by 0.4 points. For students from homes where English is not the main language spoken, the increases in scores were statistically significant. Although the differences in the mean scores decreased over the period, the differences between language groups (English and other language) were statistically significant in both 1975 and 1998. In the multivariate analyses, the negative effect of other-language background on achievement scores decreased over the period but remained statistically significant.

Language background also had a statistically significant effect at the school level. The multivariate analyses in Chapter 5 showed that, in addition to the influence of language background at the student level, as a school's percentage of students from other language backgrounds increased, its scores on tests of reading comprehension and mathematics decreased. Like the effect at student level, the effect at school level has decreased, even though it remains a significant factor.

Among 14-year-old students, those with parents in the production/labourers group (occupational group IV) had relatively stable mean scores in reading comprehension with a slight, non-significant decrease in 1998. In mathematics, mean scores for this group fluctuated over the period, but in 1998 they were the same as in 1975. This stability must be contrasted against the change for students from occupational group I, whose mean scores in both reading comprehension and mathematics declined significantly during the period. As a result, the differences between groups I and IV declined, although they remained significantly different. These differences were confirmed in the multivariate analyses in Chapter 5.

In their report on reading and mathematics achievement using data up to 1995 from the same sources used here, Marks and Ainley (1997, p. 15) stated that there was 'a decline in differences in achievement according to occupational background'. The 'decline in differences' did not continue into 1998, and *increased* again for scores on tests of reading comprehension in the multivariate analyses. In their analyses, Marks and Ainley used no school-level measure of socioeconomic status. The analyses reported in Chapter 5 included two such measures—the percentage of students in the school from occupational group I and the percentage from group IV.

For reading comprehension, the school-level effect of students from occupational group I increased from a non-significant influence in 1975 to a highly significant influence in 1995

and 1998. During the same period, the school-level effect of students from occupational group IV decreased, from highly significant in 1975 to non-significant in 1998. In 1975, a school with a higher concentration of students with professional and managerial group parents had no particular advantage over a school with a lower such concentration, while a school with a higher concentration of students with parents who were production workers and labourers was at a disadvantage when assessing influences on reading comprehension test scores. In 1998, this situation was reversed, with influence from higher group I concentrations and no influence from higher group IV concentrations. For scores in mathematics, there was a similar declining influence regarding the percentage of parents from group IV, but for parents from occupational group I, there has been a significant effect in all cohorts.

Small, non-significant differences were found in mean scores between students from non-metropolitan schools and students from metropolitan schools. There were also non-significant differences noted in the multivariate analyses.

**Implications**

Over the past decade, media reports and populist books have publicised claims by some researchers that male students are faring much worse than female students in Australian schools (see, for example, West, 2002). These reports claim there is a widening gap between the genders in academic achievement, prompting calls for special educational provision for boys in schools. This report has found that in reading comprehension female students do indeed have higher scores than male students, and that the difference between the two has increased; however, in mathematics, male students have higher scores than female students, and this difference has increased between 1975 and 1998. This does not suggest that educational policies aimed at improved outcomes for all students, regardless of gender, should be abandoned or modified. It does suggest that such calls are responses to the recognition that gender-specific policies such as the *National Action Plan for the Education of Girls* (Commonwealth Schools Commission, 1987; MCEETYA, 1994) have been successful at improving educational outcomes for female students. Just as programs for girls were targeted at specific areas to increase participation and improve outcomes, so too should programs for boys, especially in various aspects of literacy. The trends noted here indicate that it is still necessary to improve mathematics outcomes for girls, as well as reading comprehension outcomes for boys.

In 1975, when students in the first cohort in this report were tested, the war in Vietnam ended. In May of that year, post-war refugees began arriving from that and neighbouring countries in greater numbers than had arrived previously. Since then, immigration from South East Asian and other countries where English is not the main language spoken has increased dramatically. Between 1986, when data were first collected, and 2000, the last year for which data are available, the number of students from non-English-speaking backgrounds[2] enrolled in New South Wales government schools rose by 60 per cent (NSW Department of School Education, 1993a; NSW Department of Education and Training, 2000). In that time, the proportion of students from language backgrounds other than English rose from 15.2 per cent to 23.7 per cent of all enrolments. Between 1986 and 1992 alone, the number of students from Chinese-speaking backgrounds increased from 9,550 to 19,763; from Vietnamese-speaking backgrounds, from 6,830 to 10,921; and Arabic-speaking backgrounds, from 15,227 to 23,379. During the same period, the number of students from other language backgrounds decreased, most notably students from Greek-language backgrounds (18,275 to 10,914) and

[2] The New South Wales Department of Education and Training has published information on students from language backgrounds other than English in the series, *Students of Non-English Speaking Background* (ISSN 1039-0405).

Italian-language backgrounds (10,802 to 6,552) (NSW Department of School Education, 1993b).

With such dramatic changes in their clientele, schools found it necessary to ensure positive educational outcomes for a wider range of students from language backgrounds other than English. The data presented in this report show that Australian schools have been successful in providing educational opportunities and achieving positive outcomes for many of these students, reducing differences in scores between students from English-language backgrounds and students from other-language backgrounds, as measured at the student level and at the school level. It is possible that many of the more recent immigrants can be considered 'economic immigrants', choosing to migrate to Australia for economic reasons. The LSAY data sets contain only data on parents' occupations once in Australia, with no information on the socioeconomic background of students' parents prior to their arrival.

While differences in achievement by language background have clearly been decreasing, changes in differences attributable to socioeconomic status are not as simple to describe. At the individual student level, there has been a decrease in the impact of socioeconomic status, as measured by parent's occupational group, although between 1995 and 1998 that decrease has not continued. At the school level, however, there has been an increase in the influence of socioeconomic status. During this same period there have been a number of changes in the organisation of schooling in Australia, which may have an influence on school and student performance. There has been an increase in enrolments in non-government schools; rapidly increasing home prices in some suburbs of major cities have created exclusive residential zones, which in turn have also become exclusive school zones; state education policies that eliminate or reduce school zoning practices have benefited only those with the resources to take advantage of attendance at non-local schools. Recent evidence from the United States suggests that school choice policies may have benefited only those who are able to exercise these options—wealthier, non-minority families (Goldhaber & Eide, 2002; Holme, 2002). The limited availability of school-choice options in Sydney was noted in a study on the education of primary school children identified as 'gifted', prior to the expansion of selective and specialist schools in New South Wales (Rothman, 1983).

As a result of the increase in 'de-zoning' and school-choice programs in Australia, there has been a greater socioeconomic segmentation of schooling, which is reflected in the transfer of the effects of socioeconomic status from the individual level to the school level. In the ASSP 1975 sample, only 18 per cent of schools enrolled more than half of its students from families in occupational group I; in the 1998 sample, that figure had grown to 41 per cent of schools, indicating a greater concentration of students from high-SES families. During the same period, there has not been a similar shift in the number of schools with more than half of its students coming from families in occupational group IV.

Educational programs that were designed to ameliorate the effects of socioeconomic disadvantage have been changed over the last decade, shifting in emphasis from whole-school approaches to individualised remedial approaches. With the growing segregation of schools along socioeconomic lines, the achievement trends reported here suggest that it may be more appropriate to re-evaluate which programs should target individual students and which should target schools, especially as it appears that school-level socioeconomic status—when viewed as the proportion of higher-SES parents in the school community—may have a greater influence than student-level socioeconomic status on student achievement. Further research is required to examine whether student achievement would be improved more through programs that target schools with high concentrations of students from lower socioeconomic groups than those that distribute resources to individual students regardless of the schools they attend.

Students from metropolitan areas do not appear to be disadvantaged by their location; neither do students from non-metropolitan areas. Metropolitan students achieve scores equivalent to

their non-metropolitan counterparts, once other characteristics of the school are considered. It is important that educational policies that target non-metropolitan students continue to concentrate on issues of access. Programs for students from non-metropolitan areas should ensure that there are opportunities for students to undertake studies in a wide range of school subjects and to communicate with people with skills to enhance their knowledge. Jones (2002), analysing LSAY 1995 and 1998 data for outcomes by geographic location, used a six-category classification scheme for student location. He found that students from remote areas scored lowest on the reading comprehension and mathematics tests, but that students from other non-metropolitan areas (small and large provincial cities) scored above average. The higher achievement scores of students from non-remote non-metropolitan locations would account for the non-significant differences between students from metropolitan locations and students from non-metropolitan locations.

Finally, while it is not possible to discuss changes in the performance of Indigenous Australian students over time, it is important to acknowledge the large differences between the mean scores for Indigenous students and mean scores for non-Indigenous students. In reading comprehension, the mean for Indigenous students was between six and seven points lower than the mean for the entire 1995 and 1998 cohorts; in mathematics, it was five-to-six points lower. These differences can not be translated into age or year levels, but they can be discussed in light of other reports using LSAY data. Marks, *et al* (2000) reported that students from the lowest achievement quartile had the lowest rates of participation in Year 12 and higher education. Marks, *et al* (2001) reported that the greatest influence on tertiary entrance scores was prior academic achievement, as measured by the tests used here. Lamb and McKenzie (2001) found that lower-achieving students were more likely than others to experience unsuccessful transitions from school to employment. Lower achievement in reading comprehension and mathematics has been associated with lower engagement with school (Fullarton, 2002). Continued lower achievement levels for Indigenous Australian students will lead to continued lower participation and engagement in education beyond Year 9 and continued lower activity in employment. It is important that school and community programs designed to increase literacy and numeracy levels among Indigenous Australians are successful, and that they are given all resources necessary to ensure successful outcomes.

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## APPENDIX 1. COUNTS OF STUDENTS

### Table A 1 Counts of students by gender

| Full cohort | Gender | ASSP 1975 | ASSP 1980 | 1989 YTT | LSAY 1995 | LSAY 1998 |
|---|---|---|---|---|---|---|
| Literacy | Male | 3,230 | 2,659 | 2,694 | 6,549 | 6,986 |
| | Female | 3,001 | 2,436 | 2,959 | 6,893 | 6,659 |
| Numeracy | Male | 3,230 | 2,660 | 2,694 | 6,551 | 7,018 |
| | Female | 3,004 | 2,438 | 2,959 | 6,853 | 6,709 |

| 14-year-old students | Gender | ASSP 1975 | ASSP 1980 | 1989 YTT | LSAY 1995 | LSAY 1998 |
|---|---|---|---|---|---|---|
| Literacy | Male | 3,230 | 2,615 | 2,691 | 3,145 | 3,752 |
| | Female | 3,001 | 2,436 | 2,958 | 3,795 | 3,961 |
| Numeracy | Male | 3,230 | 2,615 | 2,691 | 3,149 | 3,760 |
| | Female | 3,004 | 2,437 | 2,958 | 3,789 | 3,976 |

| 14-year-olds in Year 9 | Gender | ASSP 1975 | ASSP 1980 | 1989 YTT | LSAY 1995 | LSAY 1998 |
|---|---|---|---|---|---|---|
| Literacy | Male | 1,884 | 1,630 | 1,767 | 3,145 | 3,750 |
| | Female | 1,857 | 1,595 | 2,009 | 3,795 | 3,961 |
| Numeracy | Male | 1,882 | 1,630 | 1,767 | 3,149 | 3,759 |
| | Female | 1,859 | 1,596 | 2,009 | 3,789 | 3,976 |

### Table A 2 Counts of students by language background

| Full cohort | Language background | ASSP 1975 | ASSP 1980 | LSAY 1995 | LSAY 1998 |
|---|---|---|---|---|---|
| Literacy | English | 5,926 | 4,690 | 12,033 | 11,768 |
| | Other language | 305 | 405 | 1,409 | 1,458 |
| Numeracy | English | 5,930 | 4,694 | 11,996 | 11,829 |
| | Other language | 305 | 404 | 1,408 | 1,464 |

| 14-year-old students | Language background | ASSP 1975 | ASSP 1980 | LSAY 1995 | LSAY 1998 |
|---|---|---|---|---|---|
| Literacy | English | 5,926 | 4,645 | 6,304 | 6,906 |
| | Other language | 305 | 405 | 635 | 776 |
| Numeracy | English | 5,930 | 4,649 | 6,301 | 6,930 |
| | Other language | 305 | 404 | 637 | 777 |

| 14-year-olds in Year 9 | Language background | ASSP 1975 | ASSP 1980 | LSAY 1995 | LSAY 1998 |
|---|---|---|---|---|---|
| Literacy | English | 3,588 | 3,010 | 6,304 | 6,906 |
| | Other language | 152 | 215 | 635 | 775 |
| Numeracy | English | 3,589 | 3,013 | 6,301 | 6,930 |
| | Other language | 152 | 213 | 637 | 776 |

**Table A 3 Counts of students by parent occupational group**

| Full cohort | Group | ASSP 1975 | 1989 YIT | LSAY 1995 | LSAY 1998 |
|---|---|---|---|---|---|
| Literacy | I | 1,679 | 1,899 | 5,387 | 5,735 |
| | II | 966 | 756 | 1,824 | 1,399 |
| | III | 1,001 | 694 | 2,279 | 2,551 |
| | IV | 1,078 | 822 | 1,802 | 2,294 |
| Numeracy | I | 1,681 | 1,899 | 5,392 | 5,768 |
| | II | 967 | 756 | 1,828 | 1,405 |
| | III | 1,002 | 694 | 2,290 | 2,554 |
| | IV | 1,079 | 822 | 1,795 | 2,312 |

| 14-year-old students | Group | ASSP 1975 | 1989 YIT | LSAY 1995 | LSAY 1998 |
|---|---|---|---|---|---|
| Literacy | I | 1,679 | 1,894 | 2,824 | 3,296 |
| | II | 966 | 756 | 970 | 801 |
| | III | 1,001 | 694 | 1,270 | 1,513 |
| | IV | 1,078 | 822 | 1,024 | 1,362 |
| Numeracy | I | 1,681 | 1,894 | 2,832 | 3,318 |
| | II | 967 | 756 | 968 | 802 |
| | III | 1,002 | 694 | 1,275 | 1,516 |
| | IV | 1,079 | 822 | 1,019 | 1,361 |

| 14-year-olds in Year 9 | Group | ASSP 1975 | 1989 YIT | LSAY 1995 | LSAY 1998 |
|---|---|---|---|---|---|
| Literacy | I | 1,095 | 1,317 | 2,824 | 3,296 |
| | II | 597 | 501 | 970 | 801 |
| | III | 641 | 461 | 1,270 | 1,513 |
| | IV | 603 | 552 | 1,024 | 1,362 |
| Numeracy | I | 1,097 | 1,317 | 2,832 | 3,318 |
| | II | 597 | 501 | 968 | 802 |
| | III | 643 | 461 | 1,275 | 1,516 |
| | IV | 603 | 552 | 1,019 | 1,361 |

**Table A 4 Counts of Indigenous Australian students**

| | LSAY 1995 | LSAY 1998 |
|---|---|---|
| Literacy | 366 | 431 |
| Numeracy | 370 | 441 |

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**Table A 5 Counts of students by location**

| Full cohort | Location | ASSP 1975 | ASSP 1980 | 1989 YIT | LSAY 1995 | LSAY 1998 |
|---|---|---|---|---|---|---|
| Literacy | Non-metropolitan | 2,483 | 2,156 | 2,161 | 6,041 | 5,769 |
| | Metropolitan | 3,748 | 2,940 | 3,492 | 7,401 | 7,909 |
| Numeracy | Non-metropolitan | 2,481 | 2,155 | 2,161 | 6,028 | 5,843 |
| | Metropolitan | 3,754 | 2,942 | 3,492 | 7,376 | 7,916 |

| 14-year-old students | Location | ASSP 1975 | ASSP 1980 | 1989 YIT | LSAY 1995 | LSAY 1998 |
|---|---|---|---|---|---|---|
| Literacy | Non-metropolitan | 2,483 | 2,155 | 2,159 | 3,175 | 3,214 |
| | Metropolitan | 3,748 | 2,895 | 3,490 | 3,764 | 4,484 |
| Numeracy | Non-metropolitan | 2,481 | 2,155 | 2,159 | 3,184 | 3,233 |
| | Metropolitan | 3,754 | 2,897 | 3,490 | 3,754 | 4,490 |

| 14-year-olds in Year 9 | Location | ASSP 1975 | ASSP 1980 | 1989 YIT | LSAY 1995 | LSAY 1998 |
|---|---|---|---|---|---|---|
| Literacy | Non-metropolitan | 1,452 | 1,368 | 1,424 | 3,175 | 3,213 |
| | Metropolitan | 2,289 | 1,857 | 2,352 | 3,764 | 4,484 |
| Numeracy | Non-metropolitan | 1,449 | 1,368 | 1,424 | 3,184 | 3,232 |
| | Metropolitan | 2,291 | 1,858 | 2,352 | 3,754 | 4,490 |

## APPENDIX 2. RESULTS OF MULTIVARIATE ANALYSES FOR ALL COHORTS

**Table A 6 Results of multivariate analyses for reading comprehension tests, 1975-1998**

| | 1975 | | | 1980 | | | 1989 | | | 1995 | | | 1998 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimate | s.e. | p-value | Estimate | s.e. | p-value | Estimate | s.e. | p-value | Estimate | s.e. | p-value | Estimate | s.e. | p-value |
| **Student level** | | | | | | | | | | | | | | | |
| Intercept | 51.637 | | | 49.265 | | | 52.300 | | | 50.604 | | | 51.142 | | |
| GENDER | 0.598 | 0.332 | 0.071 | 1.434 | 0.320 | <0.001 | 0.144 | 0.321 | 0.653 | 1.502 | 0.239 | <0.001 | 1.614 | 0.240 | <0.001 |
| METRO | 0.251 | 0.559 | 0.653 | 2.086 | 0.570 | <0.001 | -1.262 | 0.467 | 0.007 | 0.239 | 0.342 | 0.485 | 0.059 | 0.330 | 0.859 |
| OTHLANG | -5.005 | 0.700 | <0.001 | -3.648 | 0.854 | <0.001 | | | | -3.462 | 0.427 | <0.001 | -2.599 | 0.409 | <0.001 |
| OCCI | 3.705 | 0.391 | <0.001 | | | | 3.048 | 0.400 | <0.001 | 1.753 | 0.316 | <0.001 | 2.605 | 0.310 | <0.001 |
| OCCII | 2.135 | 0.424 | <0.001 | | | | 1.758 | 0.455 | <0.001 | 0.522 | 0.375 | 0.164 | 1.239 | 0.401 | 0.002 |
| OCCIII | 1.630 | 0.419 | <0.001 | | | | 2.131 | 0.464 | <0.001 | -0.067 | 0.348 | 0.848 | 0.583 | 0.337 | 0.084 |
| **School level** | | | | | | | | | | | | | | | |
| POTHLANG | -0.104 | 0.035 | 0.003 | -0.179 | 0.020 | <0.001 | | | | -0.043 | 0.014 | 0.004 | -0.039 | 0.014 | 0.004 |
| POCCI | 0.015 | 0.017 | 0.367 | | | | 0.070 | 0.014 | <0.001 | 0.083 | 0.012 | <0.001 | 0.102 | 0.012 | <0.001 |
| POCCIV | -0.118 | 0.024 | <0.001 | | | | -0.048 | 0.019 | 0.013 | -0.050 | 0.018 | 0.006 | -0.023 | 0.020 | 0.243 |



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**Table A 7 Results of multivariate analyses for mathematics tests, 1975-1998**

| Maths | 1975 | | | 1980 | | | 1989 | | | 1995 | | | 1998 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimate | s.e. | p-value | Estimate | s.e. | p-value | Estimate | s.e. | p-value | Estimate | s.e. | p-value | Estimate | s.e. | p-value |
| **Student level** | | | | | | | | | | | | | | | |
| Intercept | 50.861 | | | 49.744 | | | 50.981 | | | 50.806 | | | 50.864 | | |
| GENDER | -1.135 | 0.367 | 0.002 | -0.943 | 0.339 | 0.006 | -1.847 | 0.327 | <0.001 | -1.720 | 0.239 | <0.001 | -2.060 | 0.233 | <0.001 |
| METRO | 0.818 | 0.587 | 0.164 | 2.105 | 0.600 | 0.001 | -1.563 | 0.485 | 0.002 | 0.386 | 0.359 | 0.282 | 0.162 | 0.348 | 0.641 |
| OTHLANG | -2.978 | 0.774 | <0.001 | -3.267 | 0.594 | <0.001 | | | | -1.071 | 0.426 | 0.012 | -1.136 | 0.397 | 0.005 |
| OCCI | 4.442 | 0.433 | <0.001 | | | | 3.464 | 0.408 | <0.001 | 2.243 | 0.315 | <0.001 | 2.376 | 0.301 | <0.001 |
| OCCII | 2.121 | 0.468 | <0.001 | | | | 1.902 | 0.463 | <0.001 | 0.658 | 0.374 | 0.078 | 1.294 | 0.390 | 0.001 |
| OCCIII | 1.957 | 0.463 | <0.001 | | | | 2.207 | 0.472 | <0.001 | 0.462 | 0.347 | 0.184 | 0.762 | 0.328 | 0.020 |
| **School level** | | | | | | | | | | | | | | | |
| POTHLANG | -0.095 | 0.036 | 0.009 | -0.206 | 0.023 | <0.001 | | | | -0.041 | 0.016 | 0.009 | -0.015 | 0.015 | 0.324 |
| POCCI | 0.036 | 0.018 | 0.043 | | | | 0.081 | 0.014 | <0.001 | 0.096 | 0.013 | <0.001 | 0.108 | 0.014 | <0.001 |
| POCCIV | -0.066 | 0.025 | 0.009 | | | | -0.062 | 0.020 | 0.002 | -0.041 | 0.020 | 0.039 | -0.004 | 0.022 | 0.858 |

## APPENDIX 3. A NOTE ON INDIGENOUS AUSTRALIAN STUDENTS

Many analyses of school performance have shown that, on average and as a group, Indigenous Australians achieve at lower levels than their non-Indigenous counterparts. There are many problems associated with conducting research on Indigenous Australian students, especially in the secondary years. The first issue is the small number of Indigenous Australians who attend school past the compulsory years. As Indigenous Australians constitute a small proportion of the total population—approximately 2 per cent at the 1996 census (Australian Bureau of Statistics, 1997)—it is often difficult to sample enough Indigenous Australians to have statistical power for subsequent analysis. In 1998, the last year for which test scores are reported in the present study, there were 6,963 Indigenous Australian students enrolled in Year 9 in Australian schools, representing 2.7 per cent of all Year 9 enrolments. That same year, Indigenous Australian students constituted 3.8 per cent of all primary-level school enrolments.

A second issue involves the procedures often used in sample surveys, including the studies cited here. In many sample designs, schools form a stratum to be sampled, and students are selected within schools. Most sampling is conducted so that the probability of selection is proportional to school size. Many Indigenous children attend small primary schools in remote locations, and often have no direct access to schools offering secondary study. While many studies attempt to oversample locations with Indigenous Australians, it is often difficult and extremely costly to obtain adequate sample sizes.

A third issue relates to Indigenous students' school attendance patterns. As a group, Indigenous students have higher absence rates than non-Indigenous students. In South Australian government schools, for example, Indigenous students missed 24 per cent of school days during one term in 1997 and 23 per cent of days in 1999 (Rothman, 2002). With such high rates of absence, Indigenous students have a greater probability than non-Indigenous students that they will be absent on the day of initial testing.

A fourth issue is the retention of Indigenous students past the compulsory years of schooling. Indigenous students have much lower apparent retention rates than non-Indigenous students, and Indigenous students tend to be older than their non-Indigenous classmates. When conducting research among Year 9 students, especially toward the end of the school year, it is more likely that Indigenous students are no longer enrolled, officially or unofficially, at a school.

For the earlier studies used in this report, the numbers of Indigenous Australian students who were tested were inadequate for reporting. For LSAY in 1995 and 1998, Indigenous students accounted for approximately 3.0 per cent of the sample, above their proportion in the Australian Year 9 population (2.4% in 1995, 2.7% in 1998), and above their proportion in the total Australian population. It is not appropriate to discuss results for Indigenous students in the earlier samples, as they are not representative of the population of Indigenous students. The LSAY samples, however, do provide reasonable sizes for some reporting, but with much larger standard errors than reported for the total sample. In this report, all reporting of results for Indigenous students was for full cohorts only, with no comparison to non-Indigenous students, and for 1995 and 1998 only.

## LONGITUDINAL SURVEYS OF AUSTRALIAN YOUTH (LSAY)

The *Longitudinal Surveys of Australian Youth* (LSAY) program studies the progress of cohorts of young Australians between school, post-secondary education and training, and work. The oldest cohort was born in 1961, while the youngest was a nationally representative sample of Year 9 students selected in 1998.

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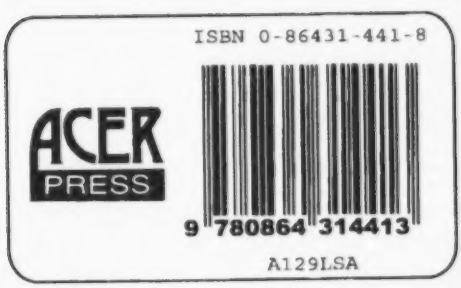


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